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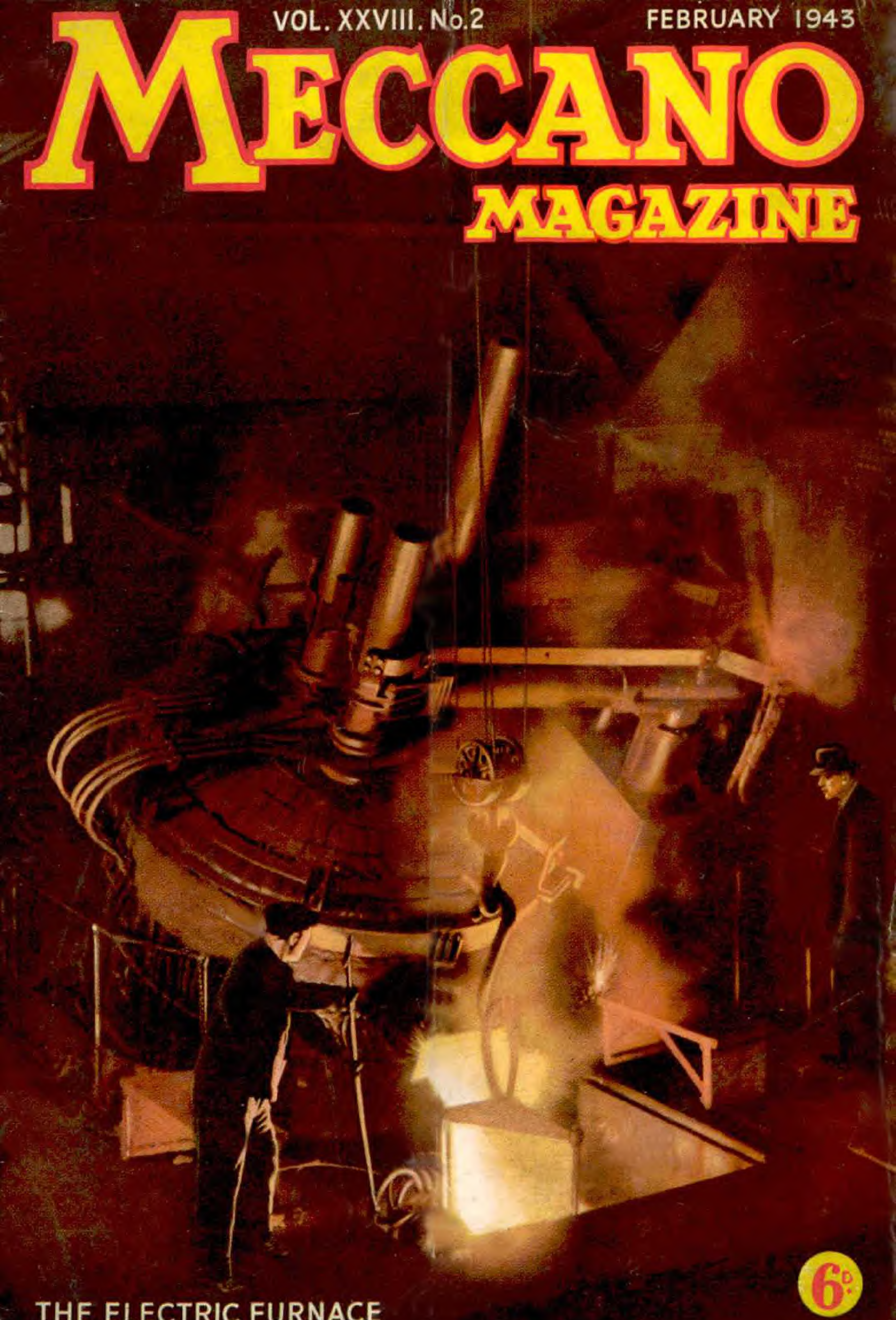

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With the Editor

Troops by Glider

Troop-carrying by glider is one of the most striking developments of this war, and therefore Mr. C. G. Grey's article on page 38 is of special interest.

Although the term "*glider*" is used to describe these towed vehicles, it must be remembered that their operation is not in the least like that of the gliders or "sailplanes" of pre-war days, which were independent craft that made use of up-currents of air to attain and maintain height. The training of a wartime glider pilot is aimed largely at giving him what may be called a special "forced-landing" technique.

I hope to publish very soon another article on this topic by C. G. Grey.

* * *

Many readers have enquired about binding cases for the 1942 "*M.M.*" I am making arrangements for the supply of binding cases of suitable size, similar in type to those provided for binding the larger Magazines of previous years, and for having copies of the year's issues bound for readers by our own bookbinders in Liverpool. Full details, with prices, will be given in next month's "*M.M.*"

Air Marshal T. L. Leigh-Mallory, C.B., D.S.O., Air Officer Commanding-in-Chief, Fighter Command, R.A.F.

Leaders in the War

Air Marshal T. L. Leigh-Mallory

Air Marshal T. L. Leigh-Mallory was educated at Haileybury, and at Cambridge where he studied law. On the outbreak of war in 1914 he enlisted in the Army. He was given a commission, and was wounded in 1915 during the second Battle of Ypres. Later he joined the Royal Flying Corps. When the war ended he was a major, in command of No. 8 Squadron.

In 1927 he was appointed Commandant of the School of Army Co-operation, and subsequently was Instructor at the Staff College, Camberley, and Deputy Director of Staff Duties at the Air Ministry. In 1935 he was given command of No. 2 Flying Training School. The next year he was sent as Senior Air Staff Officer to Iraq, and returned in 1937 to take over command of No. 12 Group, Fighter Command.

He was one of the first to realise that fighter aircraft would come to be used in large formations, and he introduced wing formation training in his Group. In November last year he was appointed Air Officer Commanding-in-Chief, Fighter Command.

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Our Airborne Troops

By C. G. Grey

Founder of "The Aeroplane" 1911, Editor until September, 1939

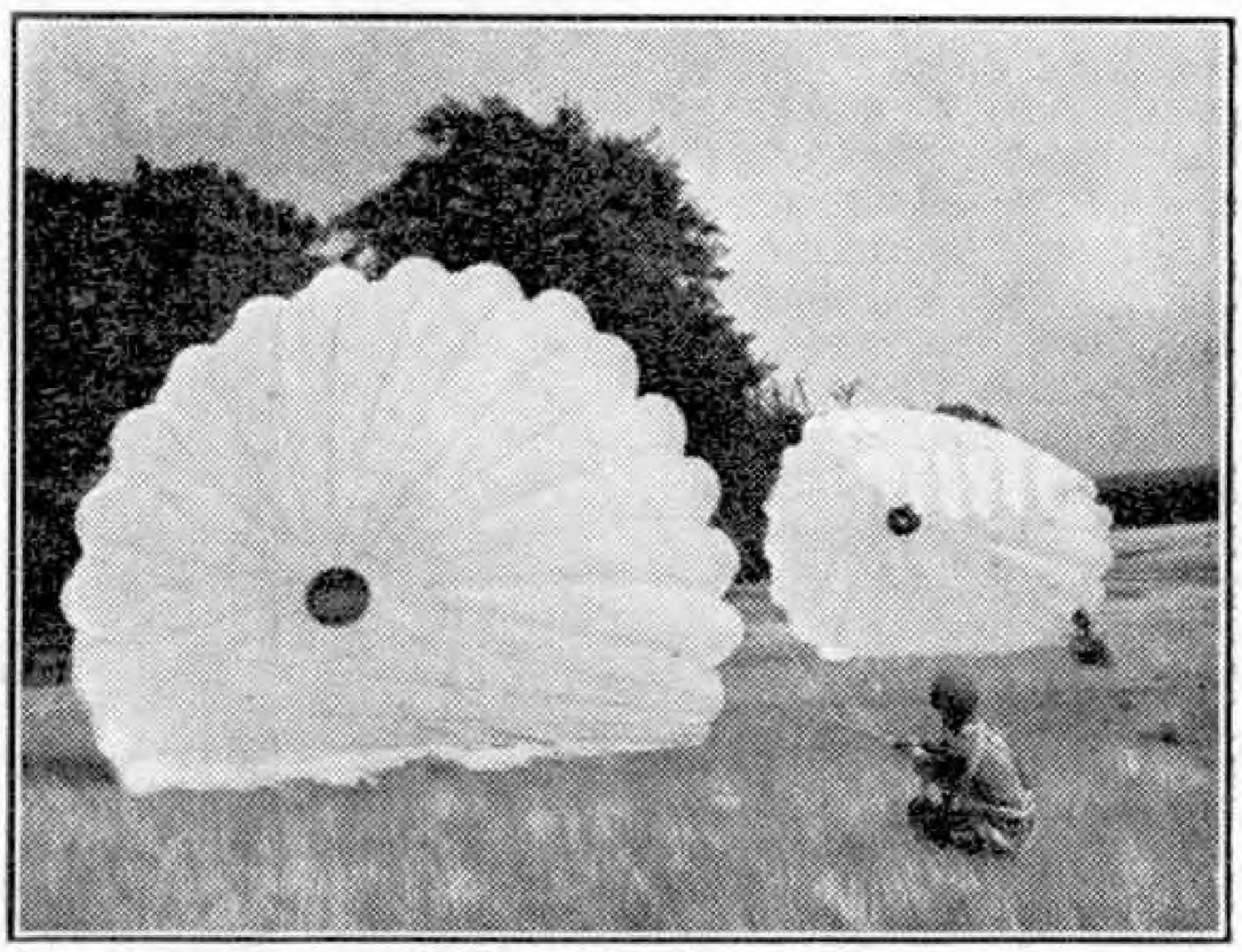
THE one really new development in this war is the Airborne Troops. We had tanks in the last war (1914-18), and even to-day tanks have not developed to the stage imagined by the originator of the idea, R. F. MacFie, who brought his schemes to me in October 1914. We had aircraft in the last war, and developments in the 24 years between 1918 and 1942 have been disappointingly small, in spite of our pride in the performance of modern machines.

Even airborne troops are not new as an idea, though they are in practice. In 1920 Lt.-Col. L. V. S. Blacker, of "The Guides"—the man who originated the flight over Mount Everest, and, with Lord Clydesdale, now Duke of Hamilton, was in the first aeroplane to fly over the mountain—wrote a story in "*Blackwood's Magazine*," describing how in one of our little wars on the North West Frontier of India a Pathan tribe was kept busy by a feint attack in front, while native troops were dropped by parachute behind them, and beat them up.

Earlier than that, in 1917, when we were throwing men away in tens of thousands trying to break the Hindenburg Line in France, I proposed in "*The Aeroplane*," which I was then running pretty well single-handed, that we should take a lot of our Avro trainers—of which we had thousands—put a couple of men with rifles and a machine-gun into each, along with the pilot, and crash-land them as nearly as possible in a bunch behind the enemy's lines at dawn some misty morning, and push in an attack in the rear which would disorganise the front-line defences while our men broke in and let the cavalry through. And that, I believe, was the first suggestion of airborne troops.

Now we have the Army Air Corps, with its own badges, and a rather curious organisation, because it is all mixed up with the Army Co-operation Command of the Royal Air Force. You can talk of the whole organisation as The Airborne Forces.

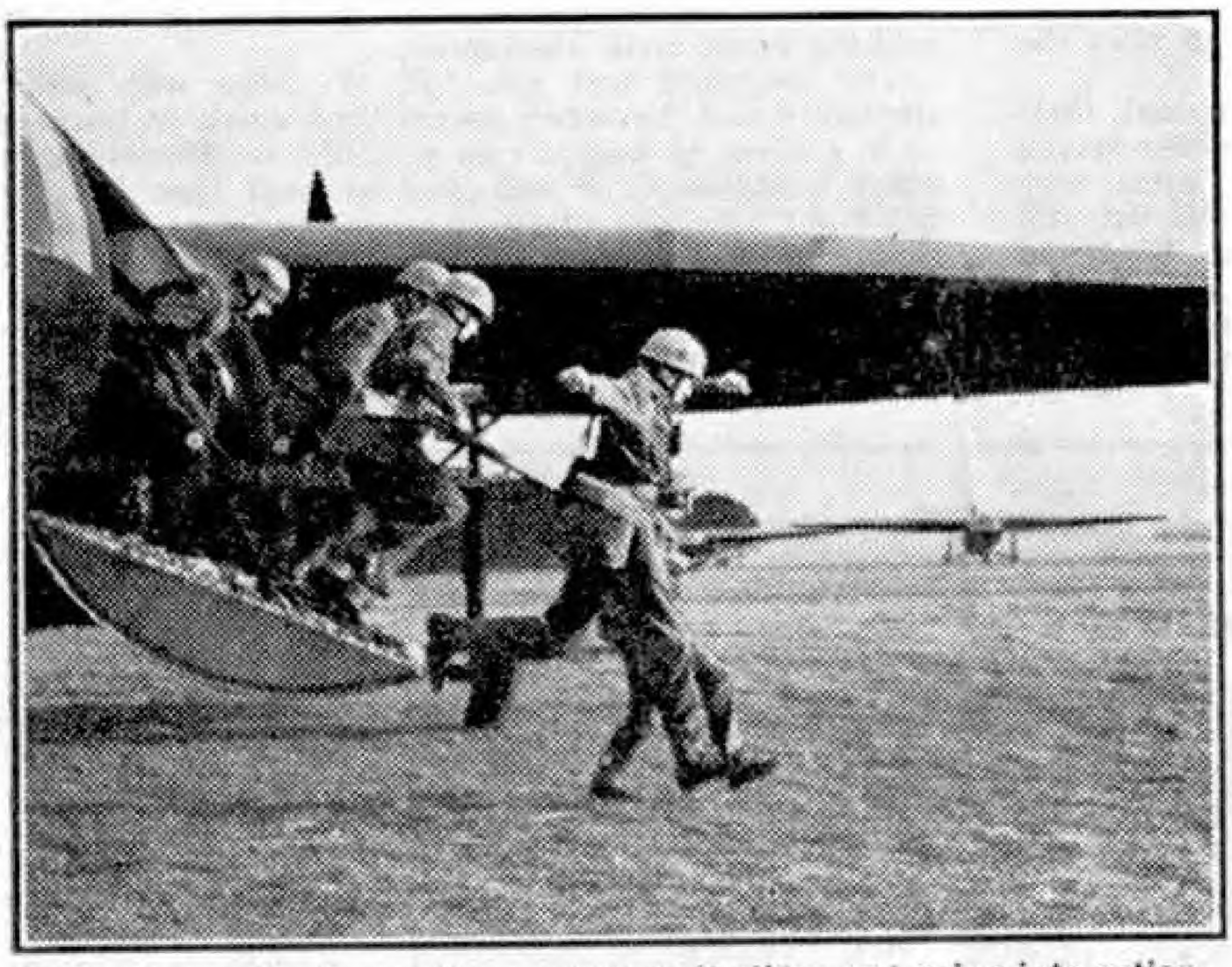
The Army is not allowed to have its own aeroplane pilots for its reconnaissance aircraft and its close-support bombers and its dive-bombers and its artillery observation machines. A lot of Army officers are seconded (that is, lent) to the R.A.F. Army Co-op. Command, to make sure of close contact and good understanding between the Army and the R.A.F. They learn to fly all types of aircraft, and can even command squadrons and wings of the R.A.F., but they go back to Army duty after being seconded for a certain time—three years in peace.



Parachute troops controlling their 'chutes after a training drop. Crown copyright photograph.

The Army Air Corps is not allowed to have aeroplane pilots, but it does have glider pilots, and before they become glider pilots all these men are trained to fly power-driven aircraft at regular R.A.F. Elementary Flying Training Schools, but not beyond that stage. After that they are taught to pilot gliders, and I may say

that handling a big glider full of men or war material on a bumpy day in clouds is a full-time job for a highly skilled man.



Glider troops de-planing from a "Horsa" glider and going into action. Crown copyright photograph.

In operation each glider has two pilots who relieve one another every hour or so. It is much more tricky than flying an aeroplane, because one is tied by the nose to the tail of an aeroplane, and where the aeroplane pilot goes the glider pilot must follow, however much his glider would like to go another way, and if he does not he may wreck the towing machine.

These pilots form the Glider Pilot Regiment, as a separate part of the Army Air Corps. The Glider-borne or Air Landing Troops are a second section of the Corps. The Parachute Troops are the third. And over them all is the Headquarters Staff of the A.A.C.

We owe the development of our Airborne Troops chiefly to the energy and initiative of Major-General F. A. M. Browning, D.S.O., and to the help which the Army has had from the Army Co-operation Command under Air Chief Marshal Sir Arthur Barratt, K.C.B., D.S.O., which supplies all the aeroplanes and pilots which, and who, tow the gliders and drop the parachutists.

We reckon that our methods of using parachute and air-landing troops are away ahead of the Germans! The clumsy way they used their parachutists in Norway and Holland and Belgium and Greece, and the messy way they flung their glider troops into Crete, needlessly cost them thousands of men, and would easily have been defeated if the defending troops had been properly armed and trained.

The strategy, tactics, equipment and armament of our airborne troops have gone far ahead since then. And the idea of our Army Air Corps is that a hand-picked, specially trained man is much too valuable to be thrown away in heaps as the Germans threw their Airborne divisions away.

The job of the Airborne Forces in this and future wars is much like that of the mounted forces under the famous cavalry leaders of the past. You have all probably read of how Prince Rupert's Cavaliers raided Cromwell's supply columns in our Civil War, and how Jeb Stewart and Phil Sheridan and Forrest used to ride round the enemy's flank in the American Civil War, and how Rennenkampf's Cossacks cut into the Japanese communications in the Russo-Japanese War. If not you still have some of the most exciting stories in the world to read. But the Airborne Troops attack over "the vertical flank," which makes all the difference in getting back. They have to cut their way through the enemy, or stand and fight till their own army cuts its way through to them. They cannot escape just by riding "high, wide and handsome."

The Parachute Troops and the Air-Landing Troops have rather different jobs. The parachutists (do not call them

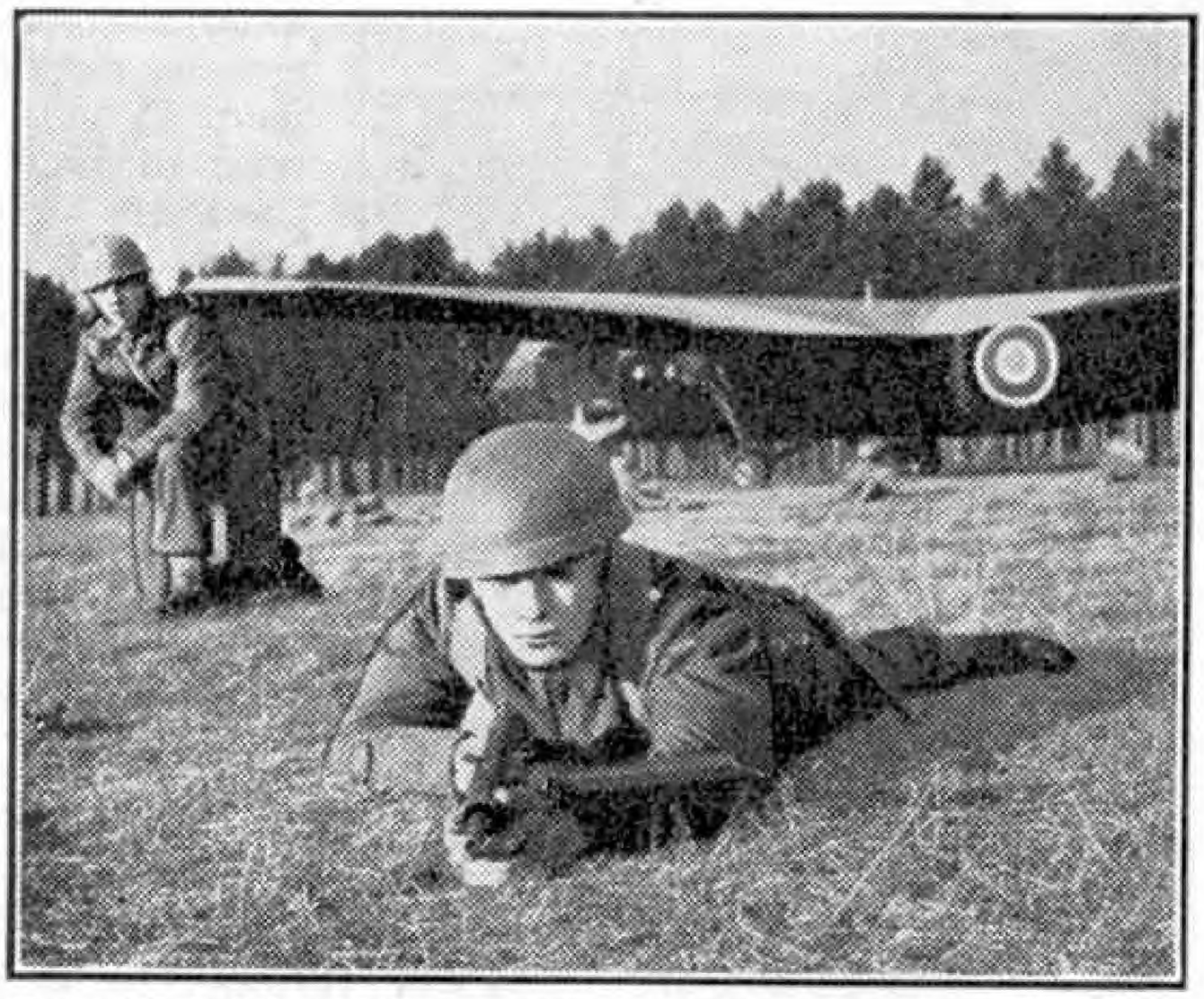
Camouflaged parachute troops await to attack. Crown copyright photograph.

paratroops, it is a silly journalistic invention, and the men hate it) are used for special jobs, such as were those who attacked that annoying German radio-location station at Bruneval, on the coast of France, and captured it, or those who landed in Italy and smashed up railways and aqueducts, or those who landed in Algiers and captured airfields so that the R.A.F. could land there.

The job of the gliders is to get men and their weapons down on ground where any power-driven aircraft would certainly crash. A glider lands very slowly and does not burn up if it cracks up. So neither the men nor this equipment are likely to be much damaged if the glider breaks up when it hits the ground. Also the men and their equipment are there on the spot, and are not dispersed even to the small extent that they would be if they dropped by parachute in a "stick" as bombs are dropped.

Also a big twin-engined towing machine can carry inside itself a load of parachutists, and equipment to be dropped by parachute, and can at the same time tow a glider containing just about as many men, or as much material.

There is a popular idea that an aeroplane can tow a train of gliders. It can, but it does not. The reason is that a glider, being, as I have said, held by the nose, sways about a lot to one side or other of the towing machine, and up and down as well. So if another glider were tied to the tail of the first glider its pilot would have a still worse job following his leader, and, besides, the pull on the tail of glider No. 1 would make its control still more difficult. So one very big glider is better than two smaller ones—I must not say what huge things our biggest gliders are, but the "Horsa" type has been shown in pictures.



One of Britain's tough and determined glider troops armed with a Sten gun. Crown copyright photograph.

The men for the Airborne Forces are most carefully picked, not only for their physique but for their intelligence. In the first place they are volunteers from all arms of the Army. They stick to their regimental badges and keep their pride of regiment, while they add to it the *esprit de corps* of the new air arm.

First of all a man is given an intelligence test, for physique is no use to airborne troops without brains, and there is no greater fallacy than the old Latin tag—"*Mens sana in corpore sano*" (a healthy mind in a healthy body). Some of the worst physical wrecks I have met have the best brains, and some of the finest physical specimens have been the biggest fools. But the airborne troops have to be healthy in both mind and body if they are to keep alive in their jobs, which are both important to the Army and dangerous to themselves.

When a man has passed the intelligence test, which I judge puts him on a higher level than 90 per cent. of the population (Service and civilian) he does the ordinary Service medical tests. His eyesight has to be up to R.A.F. standard, but I gather that the Airborne Division is not so stupidly rigid about colour blindness as are the R.A.F. medicos. And then he is given the special airsickness test. This consists of being swung, by relays of comrades, for half an hour. The victim lies flat on his back and is swung from head to toe—lengthwise, that is, not sideways. The Airborne Forces do not use those silly spinning chairs of which the R.A.F. used to be so fond, and thereby lost many a good pilot—because giddiness caused by spinning round has nothing to do with airsickness.

The swinging test gets rid of those with weak stomachs, and the survivors are then flown, in trainers or in gliders, as bumpily as possible, to discover any other weaknesses. I was glad to hear that men of the right sort are given a second or even a third chance if they fail at first. Possibly sickness at the first attempt may have been caused by something a man has eaten or drunk, as much as 12 hours before the test. It may even be caused by nervousness, because the man is so terribly anxious to join the Corps. Most men are sick the first time they go into battle, not so much because they are frightened, but because they are anxious to do well and are frightened of showing that they are frightened.

After he has been passed for parachute training, the untrained "body" is handed over to be shown how to jump. First of all the man comes down wearing parachute harness, from a tower about 60 ft. high. There is a "mock-up" parachute above him, but its rate of descent is controlled by a wire and a brake on the drum from which the wire unwinds. And the bump when he lands is softened by a sawdust and sand landing-place.

The men also train for bumps by jumping off a stage about 10 ft. high, holding on to a swing, and then letting go and dropping on to similar sand and sawdust.

The next step is real jumping by parachute from a basket, or rather a box, under a kite-balloon. About six men and an instructor go up in the box and each man drops out through a hole in the bottom. The parachutes are opened by a "static line," which is attached to a bar in the box. The man does not open the parachute himself, as do pilots who bail out of aeroplanes. As he drops each man "stands rigidly to attention on the air"—as one of them described it—and keeps his feet together and his arms to his sides till the parachute opens. That is so that his speed of drop may be as high as possible to open the parachute the more quickly. Also it lessens the chance of his arms or legs getting tangled up in the cords as they pull out of the pack.

When he has done a certain number of drops that way he then goes up in a troop-carrier, which is generally only an obsolete bomber, and does a certain number of drops from that. After which he wears the parachute badge on his sleeve, and is fit to go on active service.

The training of the parachute troops for their work on the ground is the same as that of the air-landing troops; in fact parachutists and glider-borne troops may be all used together on one job. The special training for glider troops is in the quick handling of the weapons and equipment which are carried in the big gliders. And here let (*Continued on page 70*)

Electric Furnaces for Steel Production

ELECTRIC furnaces for the production of steel may be divided into three main classes—arc furnaces, low-frequency induction furnaces, and high-frequency induction furnaces.

In 1802 Sir Humphry Davy, the great British scientist, was experimenting with a huge electric battery of 2,000 cells at the Royal Institution, London, where he was lecturer on chemistry. In the course of his experiments he connected a carbon rod to each terminal of the battery, and he found that if the two rods were first made to touch one another and then gradually separated, a brilliant arch or arc of light was formed between them. The brilliance of the light from the electric arc is due to the intense heat of the stream of vaporised carbon particles passing between the carbon rods, and this great heat is made use of in electric arc furnaces.

The heat required in furnaces of this type is obtained from an arc or arcs formed either between electrodes, or between electrodes and the material to be melted. Furnaces using the latter or direct arc method are of most importance to-day in steel-making. Of these furnaces the Héroult is probably the oldest. It makes use of three electrodes, the arcs being formed between the extremities of the electrodes and the metal. The first Héroult furnace in Great Britain was installed at Sheffield in 1909 by Edgar Allen and Co. Ltd. It had a capacity of three tons and employed single-phase current. After working successfully for ten years it was dismantled to make room for a larger and more modern furnace of the same type taking three-phase current. Among the advantages of the arc furnace for steel melting are the very high temperatures that can be obtained—higher than by any other method—and the fact that the molten metal can be very completely purified.

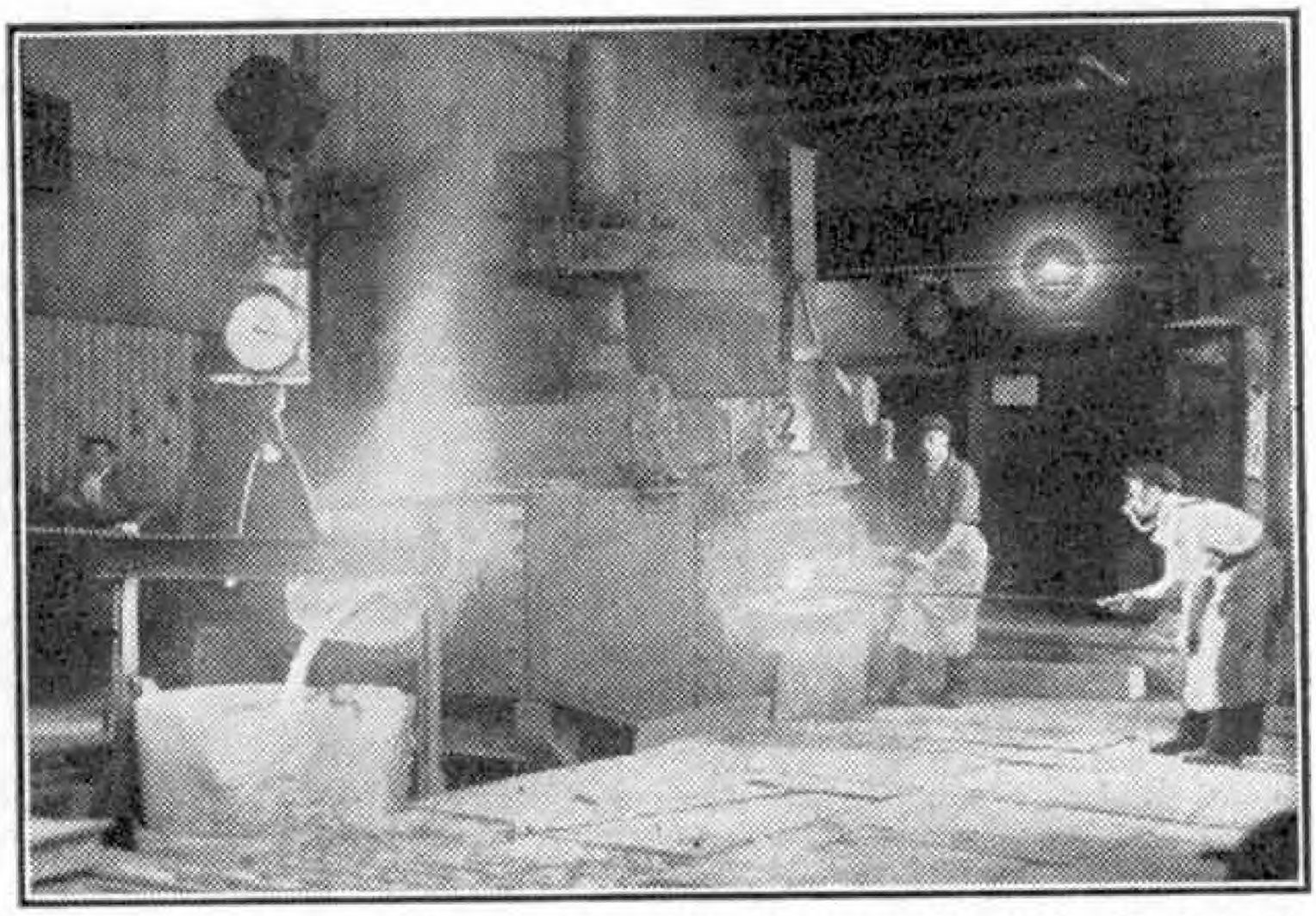
In low-frequency induction furnaces the arc is avoided and the bath of metal is heated by inducing a current in it. There are several types of such furnaces, and though they are not much used in this country they are extensively employed on the Continent.

The most interesting type of steel furnace is that making use of high-frequency induction, and avoiding any contact between the metal and either the atmosphere or fuel. The first high-frequency crucible furnace in England to be commercially used in the manufacture of tool steel was installed at Sheffield in 1927 by Edgar Allen and Co. Ltd. This furnace replaced the Huntsman crucible process, which for some 200 years had remained the best for the production of the finest tool steel.

The Huntsman process is long and laborious, and calls for a great amount of strength and physical endurance on the part of the men who operate it. The charge, consisting of broken pieces of brittle blister steel and a small quantity of scrap, in proportions arranged to produce steel of the desired composition, is placed in crucibles prepared from a special clay and placed in a furnace sunk below floor level. As the melting process proceeds, special metals such as tungsten, chromium and vanadium are added as required according to the nature of the steel to be produced. After about four hours the crucibles are lifted out of the furnace by a workman, who in order to carry out his task must stand within close range of the terrible heat. The metal is then poured into moulds.

The high-frequency process minimises discomfort and physical strain. The furnace consists of a copper coil carrying the current and cooling water, with a lining of ganister or magnesite according to whether an acid or basic lining is desired. The lining is made by centring a steel template inside the coil, leaving an annular space of approximately 2 in., which is rammed up with one of the refractories mentioned. The template or "former" is then filled with iron, scrap, alloys, etc., and when the power is put on the former melts down with the rest of the charge, leaving a lining that will be good for 50 or more "heats."

The steel itself plays an important part in the heating process, for the current that raises the temperature flows through it alone. The heating is not produced by the high-frequency current itself, but results from "eddy currents" set up by induction. The passage of a current through a coil of metal induces stray currents in adjacent pieces of metal, just as it induces currents in the secondary coil of a transformer. These currents are known as "eddy currents," and their effect here is to bring about a rapid rise in the temperature of the metal in the crucible. When the mass melts, rapid circulation takes place, the movement being vertically up the centre and down the sides. The result is that the metal becomes thoroughly mixed.



Héroult Electric Arc Furnace for making high quality steel. Photograph by courtesy of Edgar Allen and Co. Ltd.

The furnace body must be of some non-magnetic material, in which eddy currents cannot be induced, and as the heat insulation prevents heat from passing outward from the furnace itself, asbestos slate is the most convenient material of which to make the body. In spite of the very high temperature of the molten steel in the crucible the wood forming the body of the furnace does not become perceptibly warm. The necessary high-frequency current in the process is supplied by a motor generator specially designed to give the exact type of current required.

In addition to the purity of the steel produced by means of it, the high-frequency crucible process has many economical advantages.

Our cover this month, showing an electric furnace in action, is based on a photograph kindly supplied by Sulzer Bros. (London) Limited.

North to West by the G.W.R.

By O. S. Nock, B.Sc., A.M.I.Mech.E.

A JOURNEY from Crewe to Bristol, made one Sunday some months ago, proved unusually interesting. In the ordinary course of travel one occasionally sees measures put into force to meet special circumstances; these measures are nearly always in accordance with regular procedure, but as they are not often needed are unfamiliar, not only to ordinary travellers, but to railway enthusiasts as well. Single-line working on routes normally double-tracked is a case in point; so are alternative routes, definitely scheduled in case of engineering work in progress on the normal track. Such special arrangements are more likely to be experienced on Sundays, when big engineering jobs are carried out, but on this occasion I hardly expected to witness three in one run!

I should add that although this journey was made in wartime, all the diversions were due to routine renewals, and examinations, and not in any way to enemy action.

The train concerned was the 11.55 a.m. from Crewe, heavily loaded to 14 coaches, 427 tons tare and 465 tons with passengers and luggage. Every Sunday all the year round this express travels via Gloucester, instead of taking the regular route from Hereford through Pontypool Road and the Severn Tunnel.

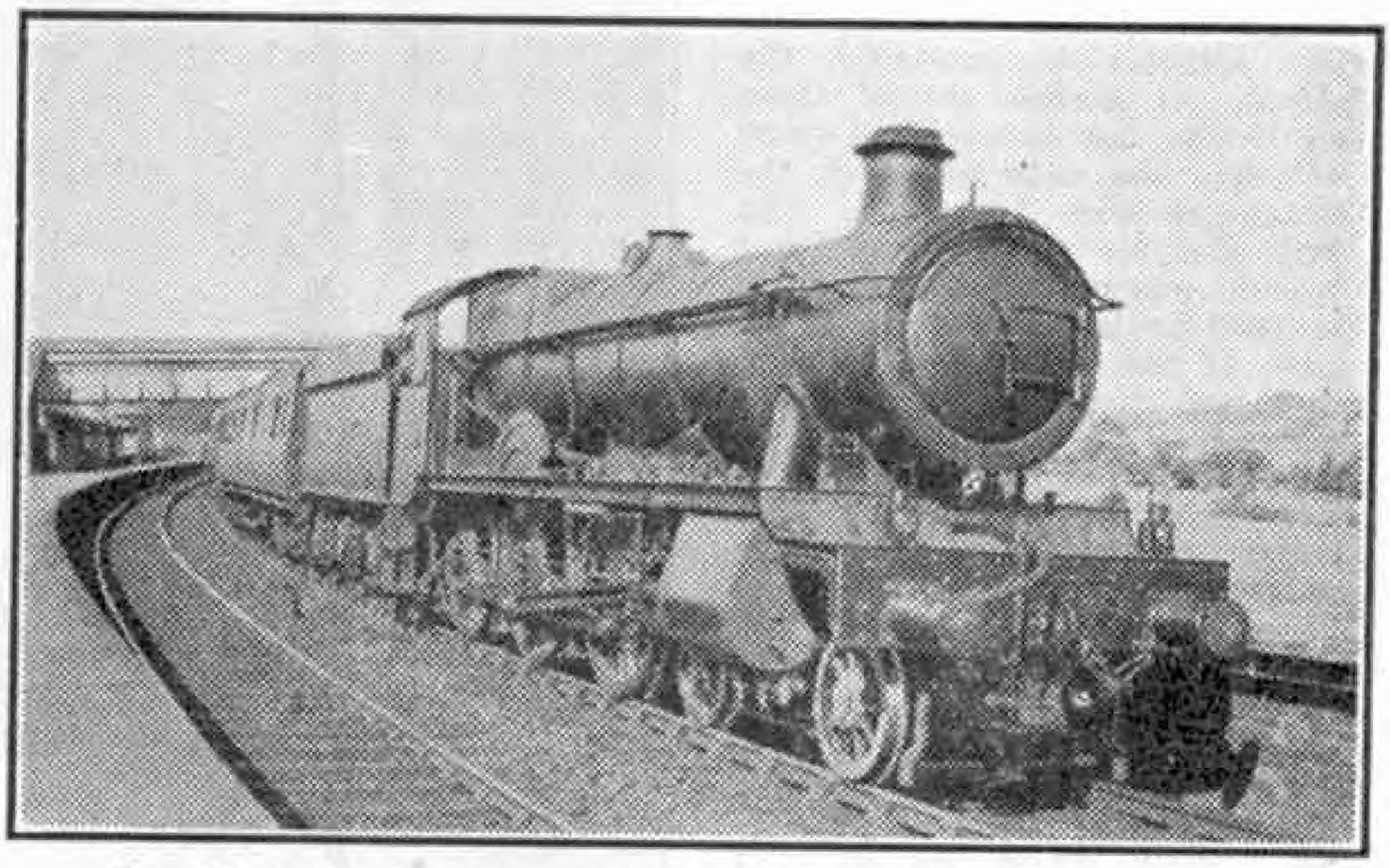
The opening run from Crewe to Shrewsbury was an interesting curtain-raiser in that we were hauled by one of the Stanier mixed traffic 4-6-0s; as this engine was replaced later by one of the Great Western "Halls," which are of very similar size and tractive power, the comparison was instructive. A signal check rather spoiled the opening run to Whitchurch, but on restarting we did some capital running over the undulating track to Hadnall; speed lay mostly between 55 and 65 m.p.h., and we ran the 18¾ miles to Shrewsbury in 24¼ minutes net.

And now the Great Western Railway took over haulage of the train, and No. 5952 *"Cogan Hall"* replaced the L.M.S. 4-6-0 No. 5256. The "Hall" class is the more powerful; both have 6 ft. diameter coupled wheels, a boiler pressure of 225 lb. per sq. in., and a cylinder diameter of 18½ in., though the G.W.R. engine has a piston stroke of 30 in. against the 28 in. of the Stanier 4-6-0. This gives the "Hall a tractive effort of 27,275 lb. as compared with the 25,455 lb. of the L.M.S. engine. The boilers are very similar, both being tapered, with the L.M.S. engine having a slightly larger firegrate area—28½ sq. ft. as against 27 sq. ft.

Up the 12-mile bank to Church Stretton we were piloted by the veteran 4-6-0 No. 4044 *"Prince George,"* stopping at the summit to detach this engine. Then on the downhill road through the beautiful upland country of the Welsh border *"Cogan Hall"* certainly showed off her paces. We swept through Craven Arms at 75 m.p.h., and on towards Ludlow we were going even faster for a time, touching 77 near Onibury. When we got down to the gentler gradients—very much like the line between Whitchurch and Hadnall on the L.M.S. stage of the journey—the speed was once again 55 to 65 m.p.h. So we passed Berrington, 22½ miles from Church Stretton, in the fast time of 23 minutes, and were still going merrily when adverse signals were sighted; this time we were brought to a dead stop, at Leominster.

There we learned that track repairs were in progress on the northbound line between Leominster and the next station, Ford Bridge. All traffic was being worked over the southbound line between these two stations, and the special regulations laid down for such circumstances require the use of a pilotman. Leominster South signal-box waved us forward with a green flag, and there standing by the lineside was the pilotman, prominent by his red armlet.

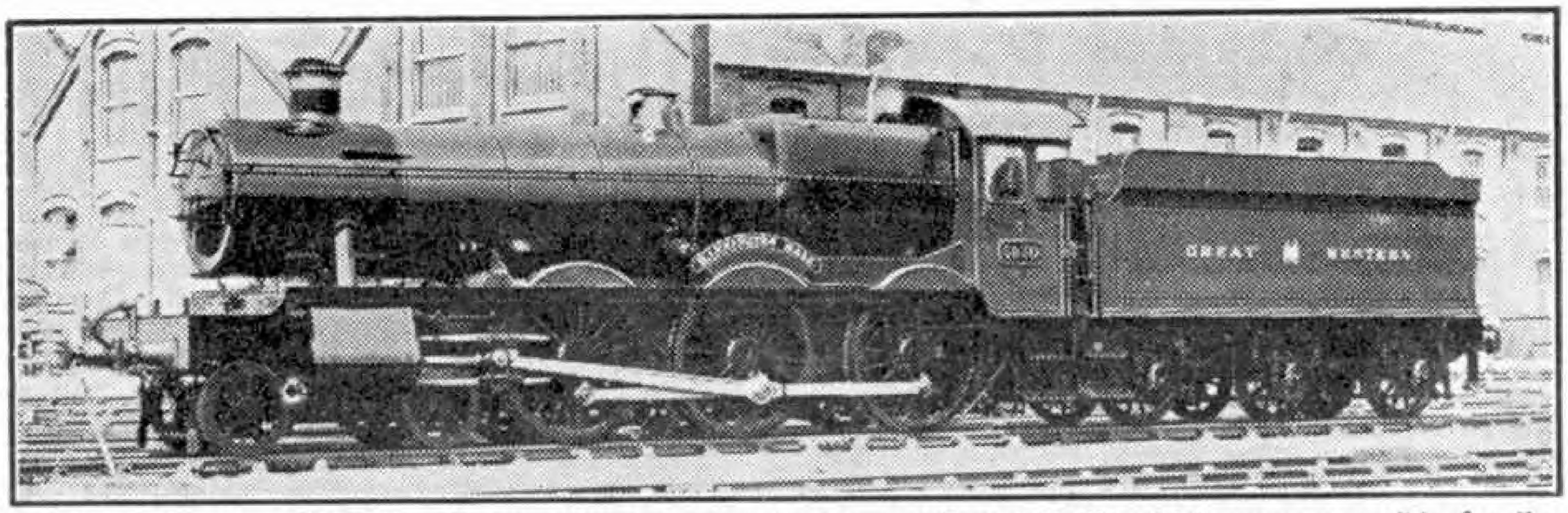
The pilotman has to ride on the engine of every train passing through the section while single-line working is in progress, except when there are several trains in the same direction. In our case an express for South Wales was running about 20 minutes ahead of us. To the driver of that train the pilotman, after explaining that single-line working was in force, would have given a ticket authorising him to proceed. And now he climbed up into the cab of *"Cogan Hall"* and so rode through to Ford Bridge.



No. 4966 "Shakenhurst Hall," of the G.W.R. "Hall" class.

After slowing through this station to set down the pilotman we picked up speed again, though on account of this special working the 9¾ miles from Berrington to Dinmore took 20½ minutes—about 10 minutes longer than normal running time. But at Dinmore we were travelling at 58 m.p.h., and the last 7½ miles into Hereford were covered in 10 minutes, so that our total time from Shrewsbury, 51 miles, was just 77 minutes, only 7 minutes over normal booked time.

The interesting route diversion now began. Instead of taking the main line southward through the Black Mountains, we set out along the single-tracked branch down the Wye Valley, towards Ross. There is a very stiff bank beyond the latter place, and as an extra coach had been added to the train, bringing our load up to 485 tons, a second 4-6-0 No. 4988 *"Bulwell Hall,"* was attached as pilot. Our driver now had another kind of pilotman with him on the footplate, an experienced local engineman to act as guide. Since this route is followed by only one through express a week, there are probably several of the main line drivers who do not know this byway well enough to go through without a road pilot. Between stations we made good progress, though with single-line working, and hand exchanging of the train staffs, it meant going dead slow at each passing loop. Between Holme Lacey and Fawley we ran at 50 to 52 m.p.h., but with three intermediate loop slowings it took us 23 minutes to cover the 12 miles



G.W.R. 4-6-0 No. 5930 "Hannington Hall," a sister engine to "Cogan Hall" which was responsible for the interesting run described in this article. Photograph by courtesy of the G.W.R.

from Hereford to Ross. Passing Ross, as usual, dead slow, we then attacked the heavy ascent to Micheldean Road; the gradient here rises at 1 in 60, but our two "Halls" gradually accelerated their 15-coach train to 27½ m.p.h., and we covered the 4.1 miles in 10¾ minutes. At Micheldean Road we stopped to detach the leading engine.

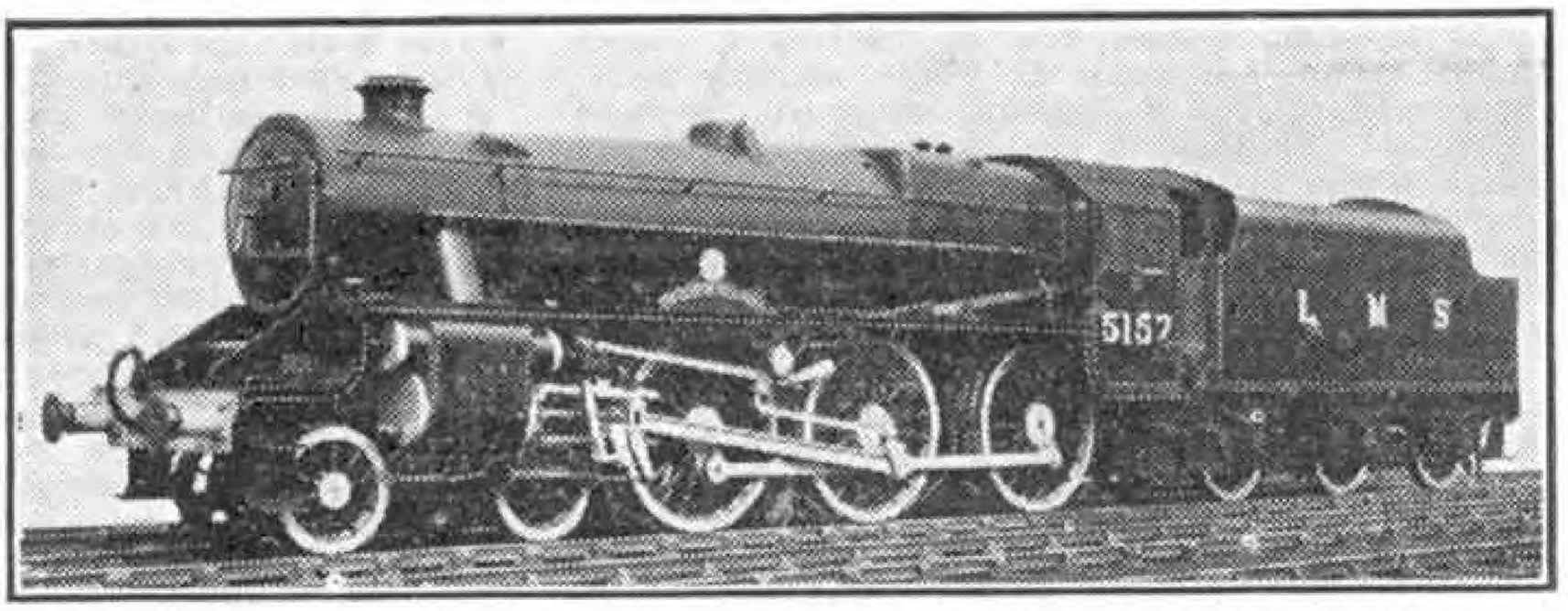
After a halt of three minutes, during which we could enjoy the beautiful country on this fringe of the Forest of Dean, "*Cogan Hall*" quickly attained 50 m.p.h., but then went very cautiously downhill to join, at Grange Court Junction, what in Broad Gauge days used to be the main line from London to South Wales. A greater contrast to the branch over which we had just travelled could hardly be imagined, and over this line, straight and level road I expected some good speed onward to Gloucester. The 22¾ miles from Hereford to Grange Court had taken 47¾ minutes, inclusive of the stop at Micheldean Road. "*Cogan Hall*" got off the mark quite well, after setting down the train staff on passing Grange Court, but then signals "on" after Oakle St. were the prelude to another instance of single line working. This time it was our track that was affected; work was in progress on a bridge near Over Junction and all traffic was being carried on the down line.

The pilotman was waiting as we drew up, and explained to our driver that we must proceed on the "wrong line." We thereupon drew ahead till the end of the train was clear of a trailing crossover road. The points were duly reversed, but being trailing points they were not fitted with a bolt. Since no passenger train is permitted to pass in the facing direction over an unbolted pair of points, the pilotman had to fix a screw clip to the switch blade to hold it fast against the stock rail before our train could be backed over the crossover. The operation was very smartly done; after drawing ahead we stood only 40 seconds before the pilotman waved us back, and propelling this long train back through the crossover on to the down line took only 1¾ minutes. Then the points had to be reversed again, and clipped; yet this second stop was only of 51 seconds duration.

Now we proceeded, with *two* pilotmen on the footplate a singular circumstance; one of these was the road-pilot, the other the single-line section pilot. So provided, we made a quiet run of 8½ minutes into Gloucester where we crossed over on to the up line again, and set down both pilotmen. Although so far as traffic is concerned this express is non-stop between Hereford and Bristol, actually a locomotive stop is scheduled at Gloucester, to take water. The run of 30¼ miles from Hereford, with all the hindrances of the Wye Valley line, and the out-of-course delays, had taken 69 minutes.

After a stop of 5 minutes we now set out on what proved to be a non-stop run to Bristol. We followed the route of the pre-war express service from Birmingham to the West of England, exercising the Great Western Railway's running powers over the L.M.S. Derby-Bristol main line for part of the way. We were somewhat delayed, by signals and permanent way operations, in getting away from Gloucester, and took 10¼ minutes to cover the first 2 miles out to Tuffley Junction; while there soon followed the regulation slack at Standish Junction where we crossed over to the L.M.S. line. After that we at last got going again at something like express speed, though of course a load of 485 tons was a tough proposition for a "Hall." Picking up from the crossover slowing at Standish, "*Cogan Hall*" got up to 54 m.p.h. at Coaley, and then settled down to the long gradual rise past Charfield and Wickwar, through the western spurs of the Cotswold Hills. The gradient is 1 in 270 here and we went steadily up; Charfield was passed at 46 m.p.h., and from Wickwar to the top we were sustaining 41 m.p.h. This involved quite a big power output, of about 1,200 horse power.

The rest of the run, from Yate onward, was a succession of slowings round sharply curved connecting lines. From Yate, up the stiff rise on to the new South Wales main line from London; down past Winterbourne, with speed rising to 56 m.p.h.; and then another slack round the curve at Stoke Gifford to bring us back on to the normal North to West route at Filton Junction. We reached Stapleton Road, a Bristol suburban station, in exactly an hour from Gloucester, 36 miles, and our total time from Hereford to Temple Meads, by this exceedingly difficult route, was only 2 hr. 22 min. against the regular weekday express timing of 2 hr. 5 min.



"The Glasgow Highlander," one of the L.M.S. Stanier mixed traffic 4-6-0s.

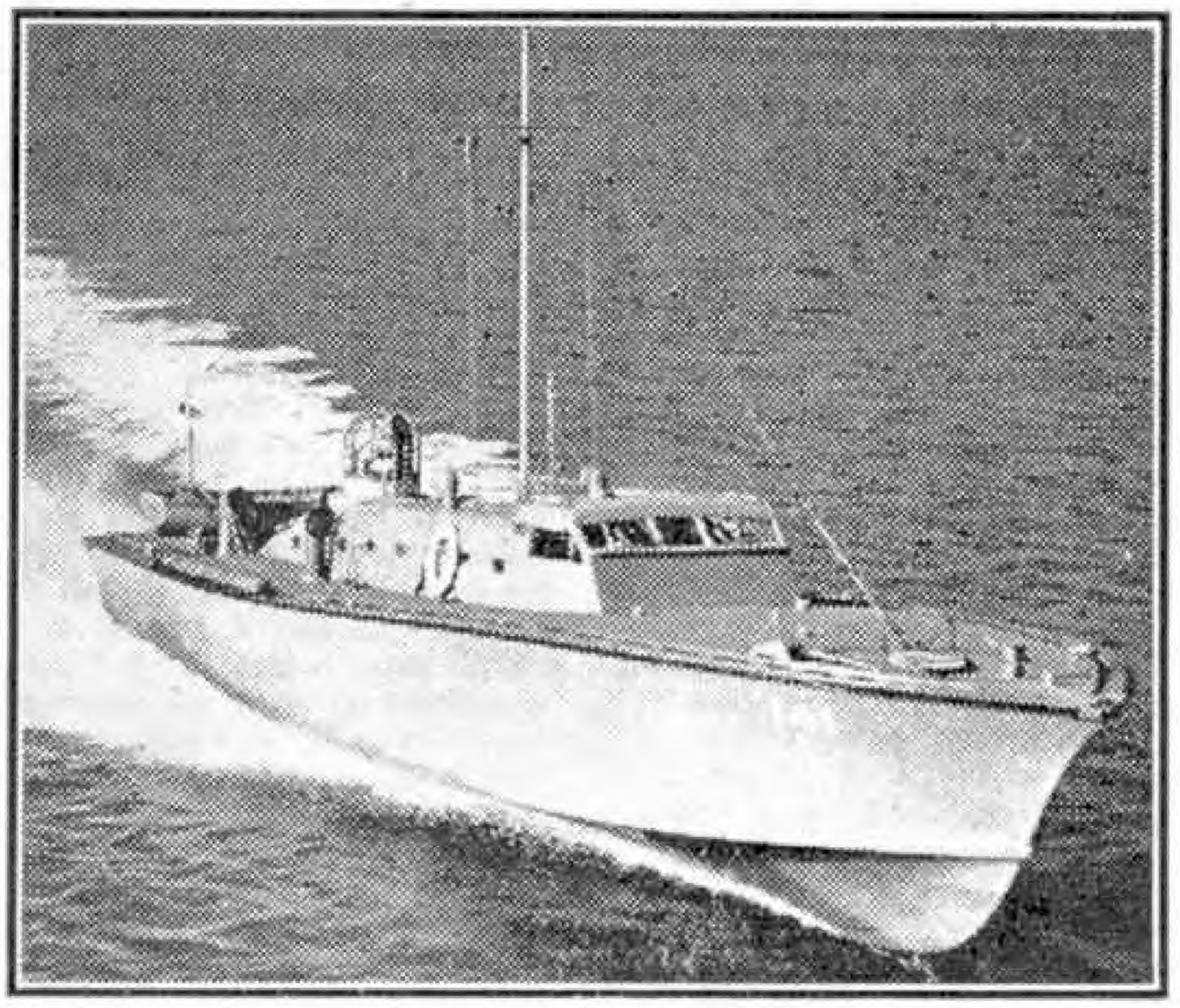
Speed Boats to the Rescue!

By Arthur Lamsley

"FOUR of our aircraft failed to return. The pilots and crews are safe." The last sentence of this radioed news item brings a sense of relief to millions of listeners. Our airmen's lives are the nation's most priceless asset.

The deeply concerned, though unknowing listeners, are apt to think the saving of our airmen a matter of good luck. This is not so. We cannot trust to capricious luck when it comes to saving the lives of literally hundreds of our airmen. We must make sure they are saved. The work has been entrusted to a department of our war effort that is a miracle of efficiency. It is known as the Directorate of Air/Sea Rescue Services. The head of this new joint Air Ministry and Admiralty organisation is Commodore L. G. le B. Corke, R.A.F., with Captain C. L. Howe, R.N., as deputy director.

Formerly this rescue work was undertaken by the Coastal Command of the R.A.F., but as the air war extended its area, becoming more widespread and intense, it became essential to co-ordinate all life-saving organisations into one unit, with centralised control. The new Directorate now embraces the work of the Coastal Command, R.A.F. and Admiralty rescue ships, the Royal National Life-boat Institution, Coastguard Service, Royal Observer Corps, Mercantile Marine, and Police in coastal towns. It also asks for the intelligent co-operation of civilians around the coast, who, seeing an airman bale out, or spotting a rubber dinghy at sea, telephone the police, military camp, Coastguard or R.A.F. station, whichever is most convenient. Civilians in the coastal Front Line can indeed render invaluable assistance in the matter of rescuing airmen. When telephoning they should give the fullest possible details, such as whether they saw airmen coming down by parachute, and giving the time, the exact locality, the approximate distance out at sea, the state of the water, and whether the shore is rocky, a stony beach, or sandy.



A 63 ft. Rescue Motor Boat. Photograph by courtesy of The British Power Boat Company.

Coastal rescue services now command a big and growing fleet of fast motor craft known as Rescue Launches. In areas where there is always aerial activity they are generally known as the "R.A.F. Life Boats." The major type of launch is 63 ft. long, powered with three 500 b.h.p. engines, and has a speed of over 40 knots for 500 miles. At a reduced speed it can cruise for 800 miles without refuelling. Its shallow draught makes it immune from danger in mine fields.

These launches are really floating ambulances, equipped with every first-aid appliance for rescue at sea. There is a hospital bay aboard, and the arrangements allow for stretcher cases to be passed through the wheelhouse into the sick-bay. Ten stretcher cases can be given reasonably comfortable accommodation under cover from stress of weather. Special nets resembling multiple rope ladders are fitted amidships to lift or help wounded or exhausted airmen aboard. All food and medical stores are kept in waterproof bags.

The crew of eight live in the forepeak. They are mostly all R.N.V.R. men, yachtsmen, motor boat enthusiasts, fishermen, with an intimate knowledge of our coastal waters, and who have graduated in first-aid and rescue work for this highly specialised war job. The launch is divided into five watertight compartments, which makes the boat practically unsinkable; and the vessel is so planned and constructed that even if she did meet with an accident or strike submerged wreckage, her unique construction and buoyancy would probably keep her afloat long enough to wireless for assistance. Scott-Paine, who designed and built the original rescue launches, spent seven years of ceaseless experiment and development in perfecting them. The initial trial, to prove the vessel all that was claimed for her, was a coastal passage under speed from Grimsby to Southampton, about 375 miles, in every class of weather and sea likely to be met with anywhere around our coasts. The boat averaged a speed for the whole trial of 36.2 knots, took 10 hrs. 29 min. for the journey, with only a stop of 5 min. to test and measure petrol consumption.

Every aircraft now carries a rubber dinghy for the use of airmen when baling out. Even Fighter pilots, who until recently relied on their "Mae West" life-jacket, now carry a one-man rubber dinghy that folds into 2 sq. ft. space when deflated and is carried in his parachute pack.

These dinghies inflate automatically on contact with the water, with the aid of a chemical preparation. If the dinghy has to stay in the water for many hours and shows signs of deflating, it is pumped up by means of a small bellows that is attached. Dinghies are usually painted yellow, a colour easily spotted from a distance, and the stranded airmen wear yellow berets. Attached to each dinghy are tablets that emit green vapour when in contact with water, and thus call the attention of the rescue launch.

Coastal Rescue Service lives literally "on its toes." A radio or telephone message sets the crew running to stations, and the craft is away from moorings in under two minutes and speeding seaward with open throttle. Skipper and navigator determine the approximate position of the stricken airmen on a chart that is always open before them, and they have such an intimate knowledge of their bit of coast that they steer a course with uncanny accuracy. Airmen, or seamen whose ship has been torpedoed, are picked up with the greatest possible care, and the dash shoreward begins, either to the base or to an equally distant centre where waits a motor ambulance with cars to take the men to hospital, or, if uninjured, back to their Service unit.

The Alcan Highway

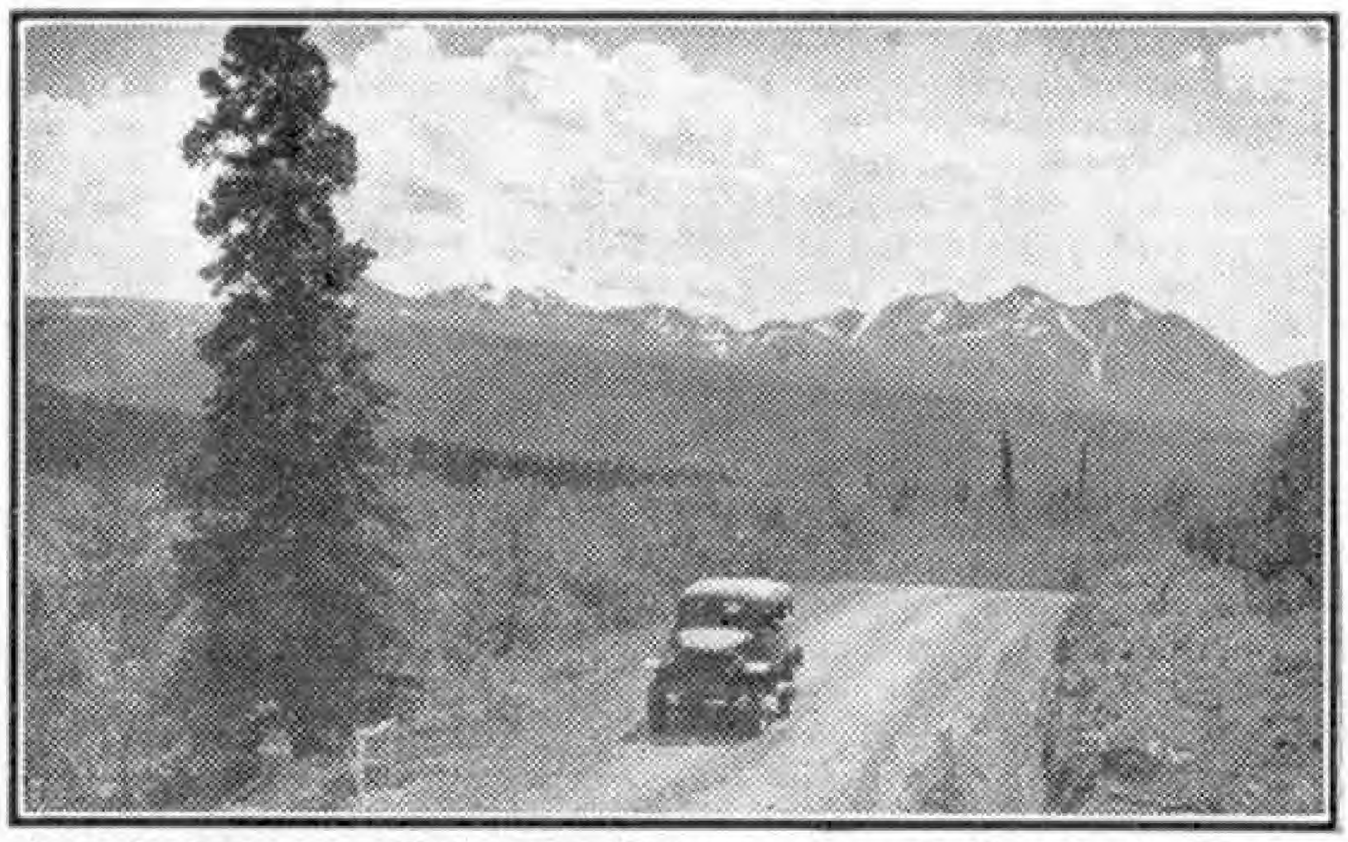
Road-Building in Arctic Regions

By James Montagnes

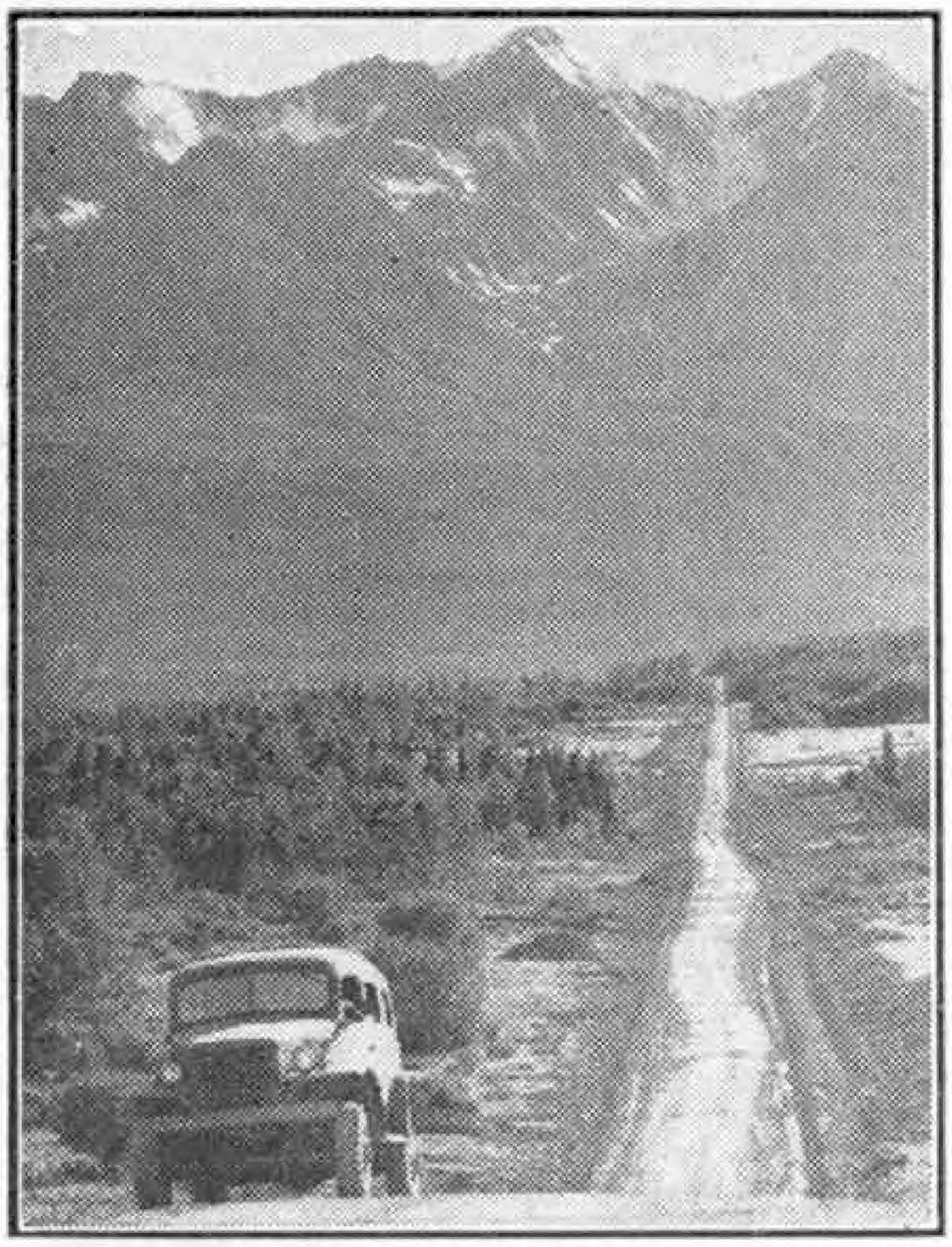
THE Alcan Highway, from the United States to Alaska through the bush of north-western Canada, is now in use. The greatest rush job of road-building in North American history has made possible this through military highway, stretching 1,600 miles through practically uninhabited mountainous bush country. The highway has been constructed by the United States Corps of Engineers and, in the words of Mr. Stimson, U.S. Secretary for War, instead of being the rough pioneer road which was all that authorities expected could be built last year as a short cut to Tokio, it is "a well-drained, well-graded truck road for practically its entire length and will afford two-way traffic over many long stretches."

Difficulties that had been expected in pushing a road through this territory were overcome by the engineers with less trouble than they were prepared to cope with. Thus the muskeg, or boggy country, which had been expected to give the road an unsteady base over long stretches, was successfully skirted wherever possible, and in sections that had to cross the muskeg, log roads were built over the bog. In one particular section of 60 miles, which had been reported all muskeg, only four miles actually were encountered.

It is planned to keep the military highway open for traffic all winter, and to make it usable for military traffic the year round, except in April and May, when thaws will make it impassable. Army arrangements for winter maintenance of the road include the provision of rest camps for the operators of lorry convoys, barracks for engineer maintenance troops, and weather observation and telephone installations along the length of the highway.



A typical stretch of the new highway through Canada to Alaska. The illustrations on this page are reproduced by courtesy of the Wartime Information Board, Canada.



Another view of the Alcan Highway, which stretches 1,600 miles through mountainous bush country, crossing muskeg swamps and rivers.

The road starts at Dawson Creek, British Columbia, north-west of Edmonton, Alberta, and runs north-west to Whitehorse, Yukon, and then across the Alaskan boundary to Fairbanks, where it connects with Alaska's highways. The line follows an airway, from Edmonton to Fairbanks, instituted as part of the Joint United States-Canada Defence Commission.

The most modern equipment was sent in to build this strategic military highway, and the mountainous forest region has echoed to the noise of bulldozers and caterpillar tractors, and to the crash of pile-drivers pounding bridge supports into the beds of icy fast-flowing mountain streams and rivers. Heavy rubber-tyred carryall scrapers filled with earth were dragged by tractors from one part of the road to another to fill in muskeg sink holes. Glacial ice formations thousands of years old are hidden two or three feet under the muskeg in some sections of the road, and the ice melted when the muskeg, which is rotting vegetation, was removed, creating a heavy morass. The holes were filled in and log roads built on top. Temperatures varied very widely while work was in progress. At times it was 35 deg. F. below zero, and at others it rose to 90 deg. F. in the shade, and gloves and head nets then had to be worn as protection against mosquitoes and other biting insects.

Much of the experience gained by Canadian road-builders in the northern sections of the provinces went into the construction of the Alcan Highway, for Canada's best road-building engineers were lent to the United States Army engineers to help in overcoming muskeg and other problems common to all roads built in northern parts of the Dominion.

This year the usefulness of the road will be increased, especially if it is extended to the Bering Strait shore of Alaska. It will relieve shipping between the United States and Alaska, and it will allow the speeding up of the work of providing air and land bases for the attack on Japan. A further advantage is that it will help in the sending of supplies to Russia.

Railway News

Heavy Tasks for L.M.S. "2" 4-4-0 Locomotives

The L.M.S. class "2P" light 4–4–0 express engines are based on a design originated many years ago for the former Midland Railway by the late Mr. S. W. Johnson. Various rebuildings and modernisations took place in M.R. days and resulted in the superheated "Class 2 Rebuilds" with 7 ft. driving wheels. Soon after grouping a new standard design was evolved and the engines built to this are numbered 563–90, 592–638 and 640–700. They have inside cylinders of 19 in. diameter with a 26 in. stroke, 6 ft. 9 in. driving wheels and a total heating surface, including superheater, of 1,286 sq. ft. The boiler pressure is 180 lb. per sq. in., and the total weight in working order 95 tons.

They still tackle heavy trains at times. We have a report of one starting off from Preston without so much as a slip with 12 bogies, probably 375 tons full, en route for Manchester with considerable climbing to face. More recently when the "Royal Scot" working the 1.0 p.m. Euston-Glasgow express had to be detached at Rugby on account of a defect, No. 524, an original Midland engine, substituted at a moment's notice, took the 17-vehicle 510-ton train on to Crewe unaided. Along the Trent valley between Nuneaton and Rugeley 50 m.p.h. was averaged and the loss of time was then not large, though a severe signal slowing at Stafford badly hampered the gradual rise to Whitmore, up which "all out" speed varied between 30 and 35 m.p.h. on the 1 in 590 398. By the time Crewe was reached 17 min. had been dropped, but the effort had been a brave one.

Ex-Great Eastern Locomotives Renumbered

Ex-Great Eastern 2–4–2Ts of classes "F4–6" are still taking a share in the working of the London-Loughton-Ongar and other suburban services. They are popular with the drivers and although not as powerful as the "N7" 0–6–2T type, they run more freely downhill.

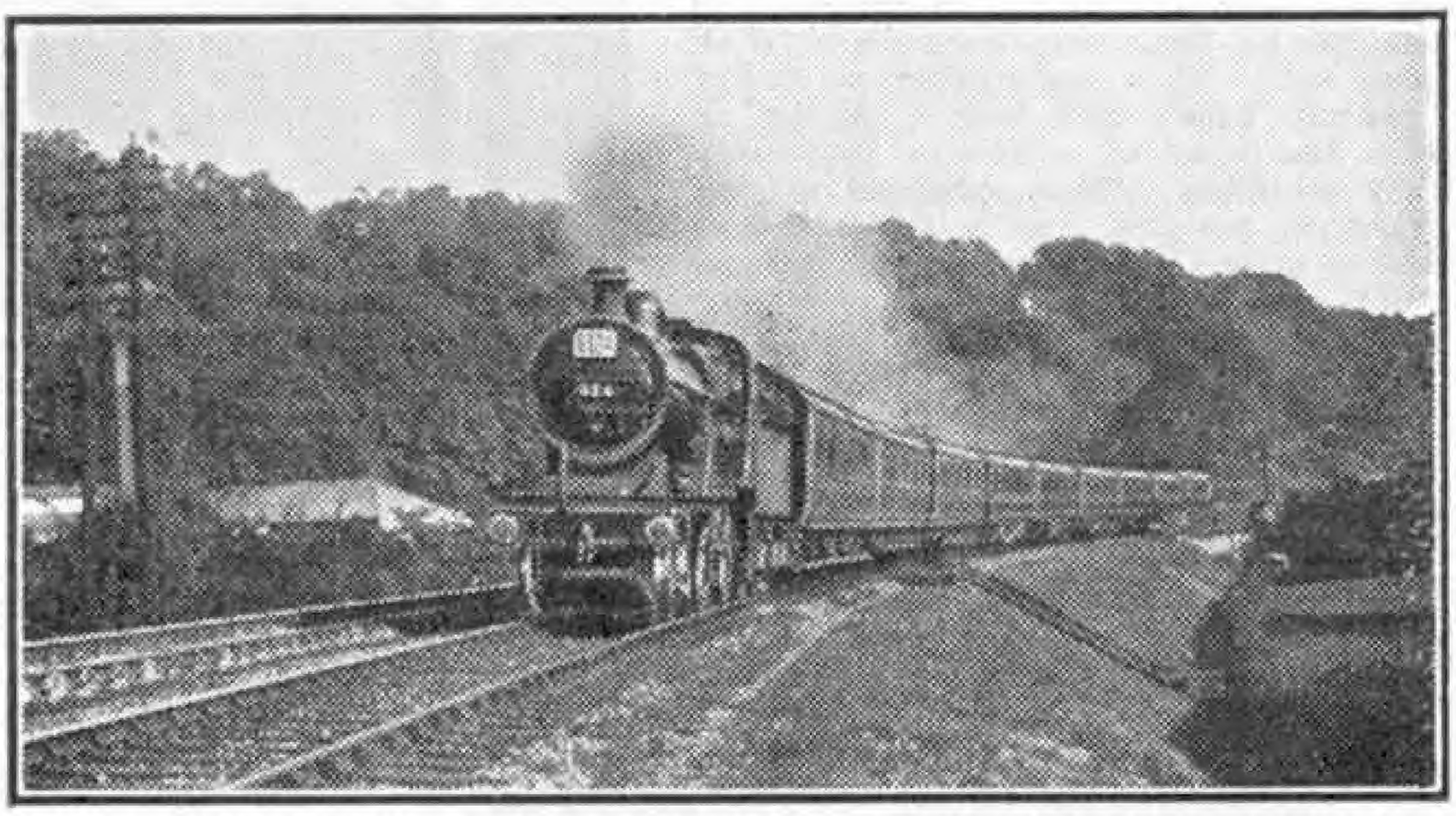
A striking coincidence at Stepney, East London, was the appearance of "N7" No. 2602 on an Ilford-Fenchurch St. train at the same time as L.M.S. class 4 2–6–4T No. 2602, which was running from Fenchurch St. to Southend on a route that commences with running powers over the L.N.E.R. Two passenger trains proceeding down the Colchester main line recently provided a curious contrast. On the slow road "B 12" 4–6–0 No. 8509 was hauling an all-stations train from Liverpool St. to Gidea Park, while running at about double the speed on the fast track, "F6" 2–4–2T No. 7789 passed at the head of an outer suburban fast train making its first stop at Brentwood. These interesting events are reported to us by Mr. R. F. Youell, Ilford.

It appears from those examples already renumbered on going through shops that the "Claud Hamilton" 4–4–0s of classes "D15–16" are to carry numbers 7650 7770 in future; similarly that the "B12" 4–6–0s will become 7415-94, and that the surviving 2–4–0s of class "E4" and the small "F7" 2–4–2Ts are to have 77xx and 75xx numbers respectively. It seems that all engines with numbers between 8301 and 8901 inclusive will have 7xxx numbers.

Tremendous Loads of the East Coast Route

Even for the East Coast main line such a succession of colossal loads as that seen on a Friday evening last summer must surely have added to the long list of L.N.E.R. records. After the 5.30 p.m. to Newcastle had gone North, a 620-ton train hauled by "A1" No. 4481 "*St. Simon*," a remarkable series of huge trains inward bound to King's Cross passed a suburban station. The first was the 5.55 in from the West Riding, the first part of which had 20 coaches on, 660 tons. The pioneer Gresley "Pacific" No. 4470 "*Great Northern*" had kept time with this from Grantham, including Peterborough stop. The second part was the "baby load" of the batch. There were 13 coaches, 440 tons, headed by "A4" No. 4467 "*Wild Swan*." Then came the 6.20 in from Newcastle with the equivalent of 20 on, including two tourist "twins," two bogie vans and one non-corridor, 620 tons, headed by streamlined 4–6–2 No. 4498 "*Sir Nigel Gresley*."

At 6.35 followed the first part of "*The Flying Scotsman*," 20 on, 660 tons. The second part had 17 corridors including van, with two tourist "twins," 658 tons. Exceptionally, both sections were worked that evening by "V2" 2–6–2 locomotives, Nos. 4892 and 4821 respectively. This was succeeded by the 7.8 in from the West Riding, 19 on, 645 tons, and the 7.26 in from Edinburgh, 18 heavy bogies, 1 van, 1 truck, 620 tons. The last two were hauled by "A4" No. 4485 "*Kestrel*," and No. 4484 "*Falcon*."



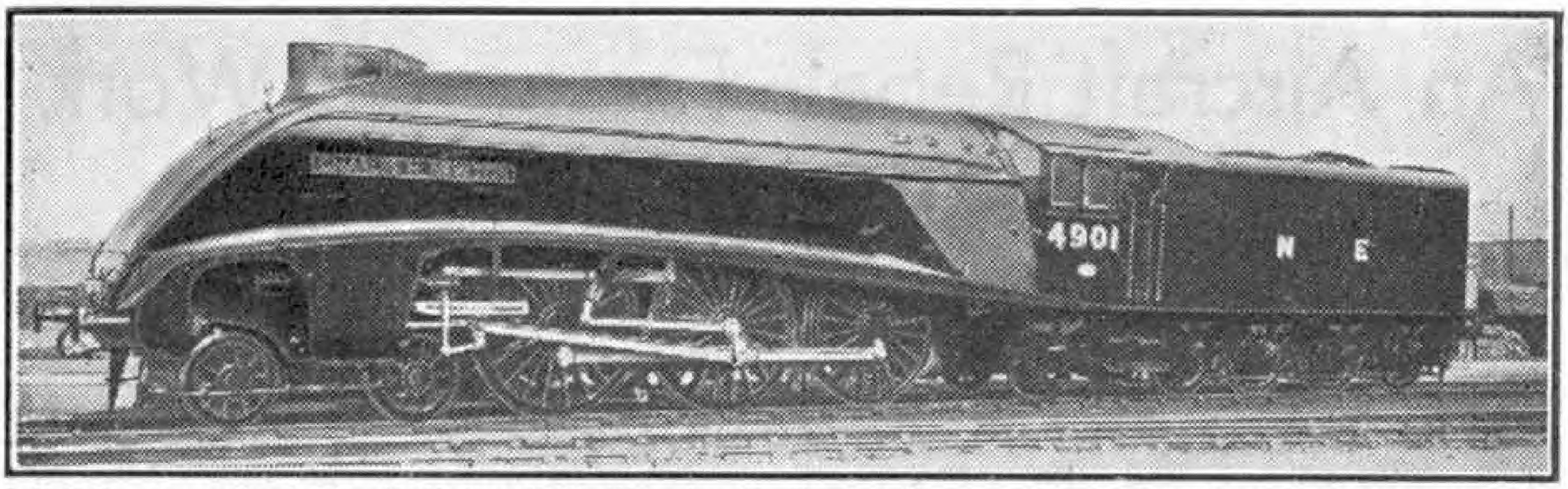
L.M.S. relief Derby-Glasgow express hauled by re-built Midland class "2" 4-4-0. Photograph by H. Gordon Tidey.

The 7.26 p.m. arrival was half an hour late, but all the others were not more than 5 to 15 min. behind time on a day when the maximum allowable number of passenger trains was being run and freight traffic was busy too, as always at the present time. The average gross weight of these seven up expresses was nearly 620 tons each. All were very full.

The operating problem within King's Cross terminus set by such a sequence of tremendously long trains was immense, as in nearly every case the rear portion of each had to be detached and shunted to another platform before unloading could take effect. At the same time outward short and long distance traffic was considerable, and the 7.0 p.m. down "*Aberdonian*" was dispatched in two heavy parts.

* * * *

Over 15 million tons of coal a year are needed to keep the 20,000 British locomotives in steam. Our railways now use 13 per cent. more coal than two years ago.



L.N.E.R. streamlined "Pacific" No. 4901 "Charles H. Newton," as now running with valancing removed to give access to the motion. It is named after the Chief General Manager of the L.N.E.R. Photograph by courtesy of the L.N.E.R.

L.N.E.R. No. 4901

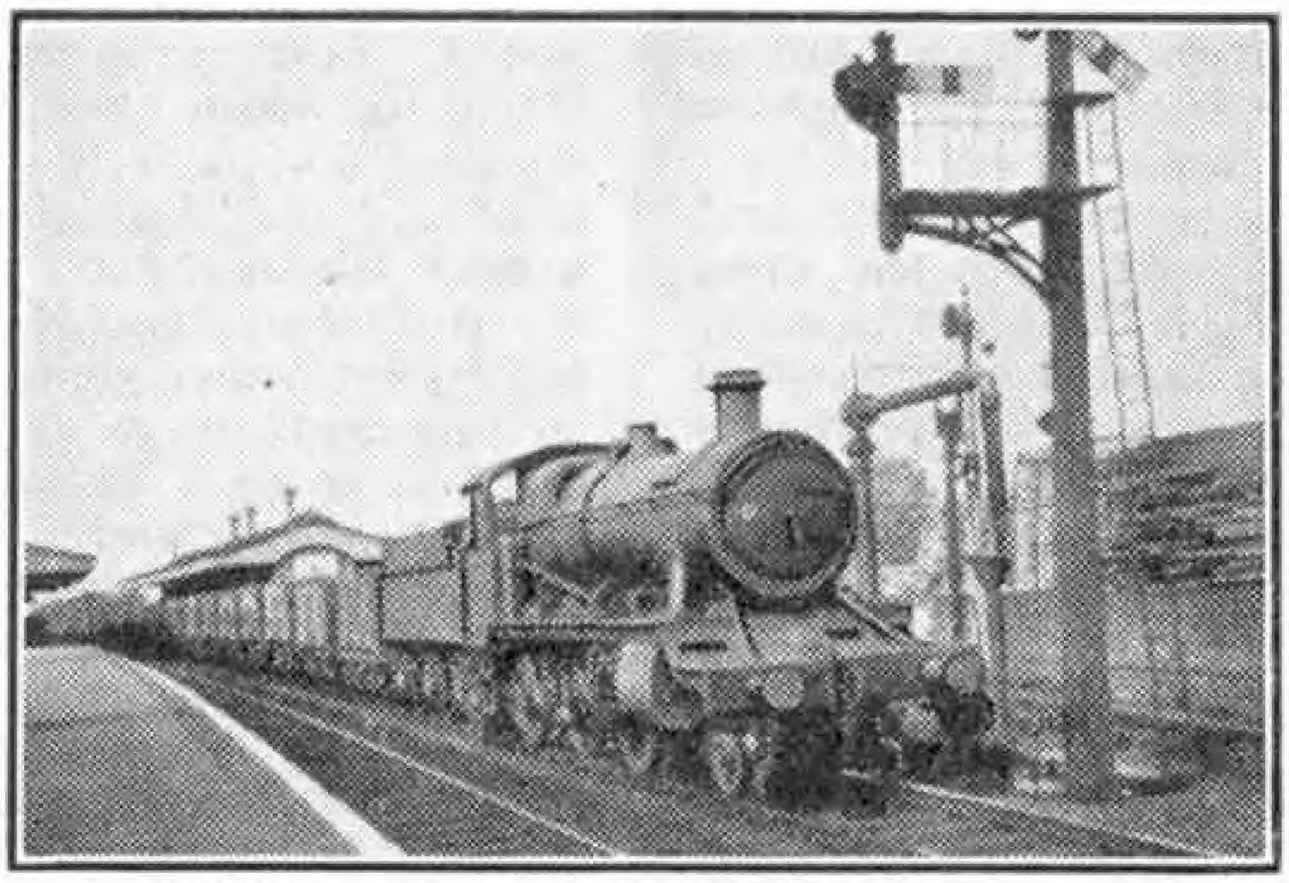
No. 4901 is one of the newest of the famous series of "A4" Pacifics. It was built in 1938 and until recently was named after the bird "*Capercaillie.*" Now however it carries the name of the recently appointed Chief General Manager, "*Charles H. Newton,*" and appears in wartime black livery with reduced lettering as now standard. This engine is one of the four Gresley stream liners fitted with the Kylchap arrangement of blast pipe, with double chimney, which has proved highly effective.

The finest performance ever recorded in this country in the way of sustained high speed with so heavy a load was achieved by No. 4901 between Darlington and York while working an up East Coast express. Hauling 21 corridor coaches weighing 665 tons tare and no less than 730 tons full, including a crowded complement of passengers with luggage, etc., an average speed of 75.9 m.p.h. was sustained for 25 miles! The maximum reached was 78½; for mile after mile, with this tremendous train and little or no assistance from gradients, speed remained steadily at 76–77 m.p.h.!

Another of No. 4901's outstanding achievements was to average 90.3 m.p.h. over the 27 miles of varying gradients between Huntingdon and Hitchin, including a 1 in 264–200 rise after Three Counties, when hauling the "*West Riding Limited*" high speed train from Leeds to King's Cross, weighing 295 tons full.

G.W.R. 2-6-0 Classes

The engine seen in the lower illustration on this page is one of the latest of many series of 2–6–0 mixed traffic locomotives built at Swindon since 1911, the total number in service at the beginning of the war being 256. The weight distribution has been modified in those built more recently in order to make them more suitable for fast running. The driving wheels are 5 ft. 8 in. in diameter. The boiler and fire-box are the same as those of the "Aberdare" inside cylinder 2–6–0 mineral class, with a 14-element superheater and total heating surface of 1,670 sq. ft. The boiler pressure is 200 lb. per sq. in., and the engines have two outside cylinders of 18½ in. diameter and the long G.W.R. standard stroke in such cases of 30 in. At the present time they are to a great extent employed in handling the vast wartime freight traffic.



An up G.W.R. coal train passing West Drayton. The engine is 2-6-0 No. 9304.

Electric Locomotives' Nameplates for Salvage

After a life of some 15 years, the large bronze nameplates that have been familiar to travellers on the Inner Circle and Baker Street-Rickmansworth sections of the Metropolitan section of the London Passenger Transport Board are being removed from the dark red electric locomotives that haul trains formed of steam stock over the inner London lines. With the exception of one, which is to go into the Board's museum, the nameplates are to swell the salvage effort. The names of the locomotives in order from Nos. 1–20 were as follows: "*John Lyon,*" "*Oliver Cromwell,*" "*Sir Ralph Verney,*" "*Lord Byron,*" "*John Hampden,*" "*William Penn,*" "*Edmund Burke,*" "*Sherlock Holmes,*" "*John Milton,*" "*William Ewart Gladstone,*" "*George Romney,*" "*Sarah Siddons,*" "*Dick Whittington,*" "*Benjamin Disraeli,*" "*Wembley 1924*" (the locomotive exhibited at the British Empire Exhibition), "*Oliver Goldsmith,*" "*Florence Nightingale,*" "*Michael Faraday,*" "*John Wycliffe,*" "*Sir Christopher Wren.*"

For reasons of economy in maintenance these locomotives are now to be painted service grey with a red line, black solebars and fittings with red headstocks. They were the only named British electric locomotives in service but the number of such separate engines in this country is not great.

Three Million Railway Questions

British railway inquiry offices and telephonists are dealing with questions at the rate of more than one a minute and to the extent of millions in a year. The inquiry bureau at one great London terminus alone has broken all records by handling 1¼ million queries in a year and other main line stations report similar conditions. Three million questions have been answered in two years since their institution by the 40 men and women who staff the 16 information booths set up by the railways and London Transport in London streets, station forecourts and other prominent positions, where they are greatly appreciated by members of the British, Allied and Empire Forces.

An Aircraft Repair Factory at Work

By the Editor

A QUESTION I am often asked is: "What becomes of all the aeroplanes that are damaged by enemy action or in the course of training flights?" The answer is that, with very few exceptions, they are all quickly repaired and put into service again. Recently I had the interesting experience of visiting a factory in North-West England where such repairs are carried out, and although much that I saw cannot be described, I am able to give readers some idea of what goes on there.

Armed with my permit from the Ministry of Aircraft Production, I presented myself at the Gate at the entrance to the grounds. There my permit, my identity card and my Press certificate were scrutinised. I signed my name in a book of impressive size—"Block letters please!"—and an escort came out and sat beside the driver of my car during the short journey to the factory entrance. Further examination of documents and more signing followed, and at last I was really inside. I felt reassured to find that such precautions were taken against the entry of any unauthorised person.

Now for the factory itself. It is utterly different from a production factory, in which work proceeds smoothly from one operation to another according to an unvarying plan. Here anything like an assembly line is impossible. Each machine that comes in for repair brings its own special problems, for no two are damaged in exactly the same way or to the same extent. Each repair job therefore is really a separate operation, carried out by small groups of individuals working independently of other groups. Great skill and much experience are needed to assess the extent and nature of the damage and to plan a scheme for tackling the job in the most effective way.

The component parts of an incoming machine carry a certain amount of dirt and grease, and before they can be properly examined they have to be thoroughly cleansed. They are then scrutinised by experts who decide which are sound, which can be repaired, and which are beyond repair and therefore must go for salvage. The necessary repairs are effected and the renewed parts and the sound ones are passed to the group dealing with that particular machine, the body of which is itself undergoing renovation. Thus the processes of repair, renewal and assembly go on until the job is complete.

Except for comparatively slight repairs and adjustments, engines are not dealt with here, but by their makers. In due course they arrive to be fitted into the repaired aircraft. Dashboard instruments also, unless only slight adjustments are needed, pass through the hands of their makers. The room in which these instruments are tested is in striking contrast with the seething activity of the rest of the factory. Here all is quiet, and the white-coated workers, armed with nothing more deadly than a small screwdriver and a stop-watch, go about their jobs with calm dignity.

I have been familiar with aeroplanes for many years and have done a good deal of flying, but this was my first close acquaintance with the "innards" of the machines. These aircraft, whose austere outward lines express the most inflexible purpose, contain within them an amazing amount of mechanism, and, to me, a bewildering array of pipes, tubes and wires, each contributing to the operation of some special "gadget." Before the repaired machine is passed out of the shops every one of these tubes and wires is tested; nothing is left to chance here. When the shops have done their work the repaired aeroplane is taken over by a test pilot and put through its paces with the utmost thoroughness. Then, if the report is satisfactory, and it is rarely not so, a ferry pilot comes along to fly the machine to wherever it is required. Back into service; as good as new

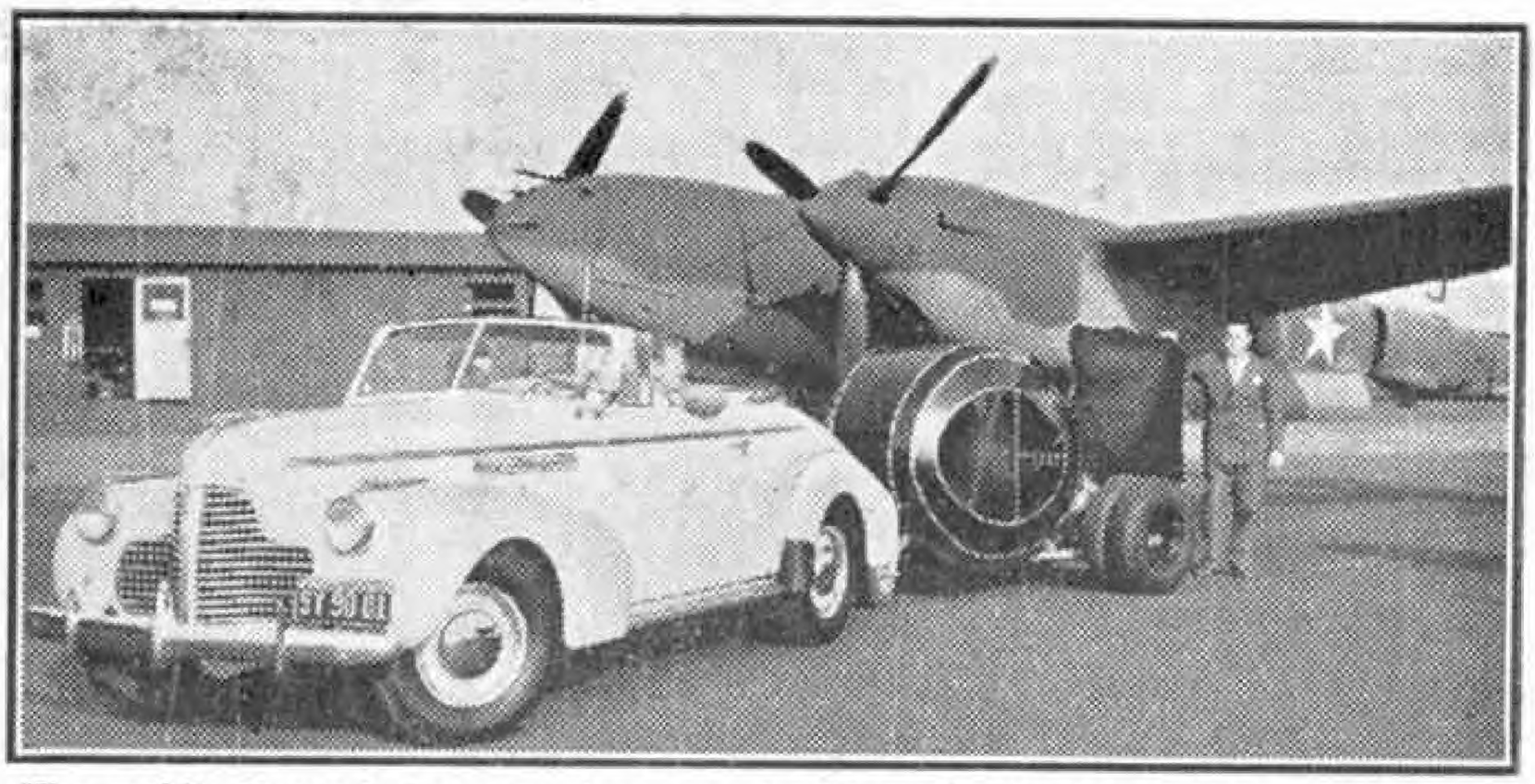
In walking through the shops one sees every conceivable kind of repair going on, involving both metal and wood; and the ingenuity displayed in dealing with the many awkward problems is remarkable. It was particularly interesting to note the considerable number of women and girls employed, and it was obvious that many of them are first-class workers. Several were engaged in welding, and I was told that some of them show quite outstanding ability at this work, even when compared with skilled men.

My general impression of this factory, may be summed up in three words; efficiency and speed.

Mobile X-ray Laboratory for Aircraft

RAPID servicing of military aircraft is of very great importance in war time. A new aid to achieving this is a completely equipped mobile X-ray laboratory designed at the Lockheed Aircraft Corporation plant and now being supplied to the U.S. Army Air Forces. With this equipment the airscrew, undercarriage unit, or other part of an aircraft back from air combat with the enemy can be X-rayed on the aerodrome immediately after landing, so that possible structural weaknesses developed during the flight and invisible even to the trained eyes of the ground staff can be detected. This penetrating examination shows whether the machine must be "grounded" for repairs, or can be allowed to take off immediately for further active service.

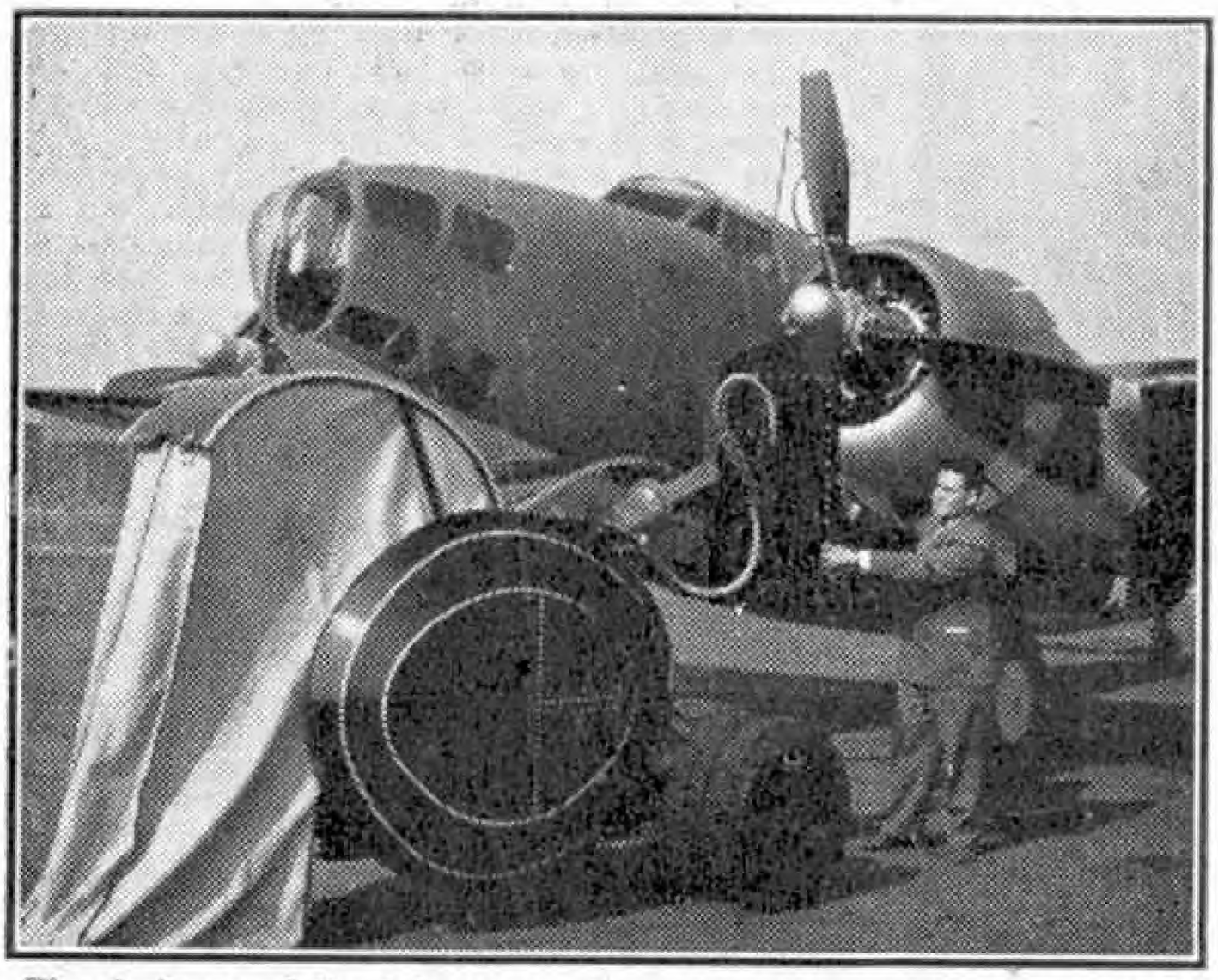
The laboratory is a self-contained unit mounted on a two-wheeled trailer, and is designed to be towed by a motor car or truck. The X-ray apparatus is at the rear, mounted in a yoke at the end of a telescopic boom operated by hydraulic mechanism in the trailer. This mechanism can rotate the boom through a complete circle, move it forward or backward 16 in., and raise or lower it through a distance of 6 ft., so that any vital part of an aircraft can be photographed without dismantling. It has automatic control, and is worked by one man, who merely switches on the machine for the set exposure, and it automatically switches itself off at the end of that period. At the front of the trailer there is a light-proof curtain attached to a hinged top section of the body, and the dark room is formed by raising this section and extending the curtain, behind which are the necessary developing tank, dishes, chemicals, and water supply.



The mobile X-ray Laboratory drawn up in front of a Lockheed P-38 "Lightning" Fighter. Photographs by courtesy of the Lockheed Aircraft Corporation, U.S.A.

The trailer is towed out to the aircraft awaiting examination, and the X-ray photograph of the aircraft part concerned is taken, an action that requires only one to two minutes. Photographic plates up to 14 in. × 17 in. can be used. The operator then enters the dark room to develop and fix the negative, which only takes about 12 minutes.

When this laboratory is in the hangar the wheels are removed and it can then be used for routine examination of aircraft parts.



The designer of the laboratory shows how the portable X-ray outfit can photograph one of the airscrew blades of a Lockheed "Hudson" reconnaissance bomber.

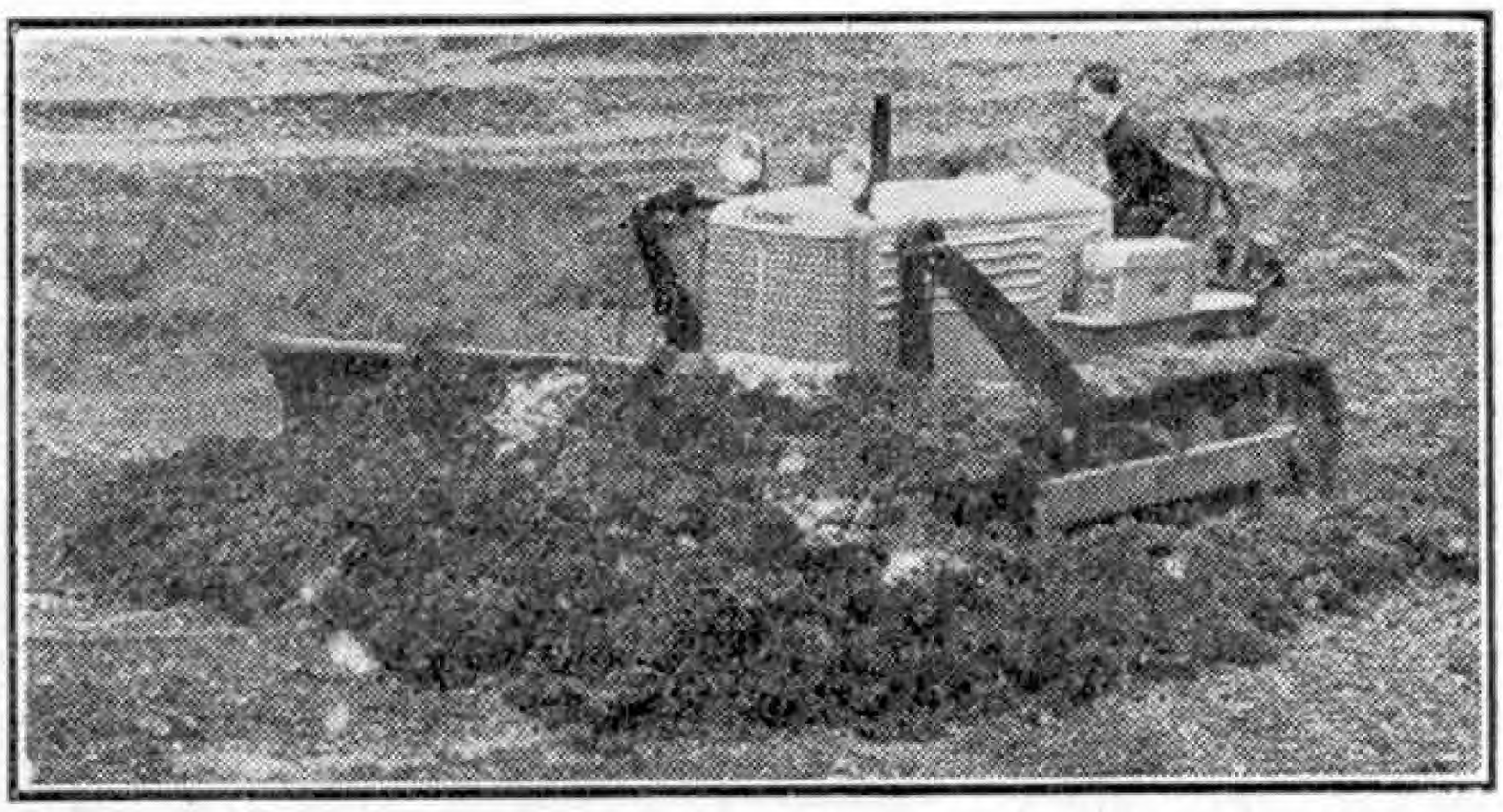
Engineering News

New Bridges

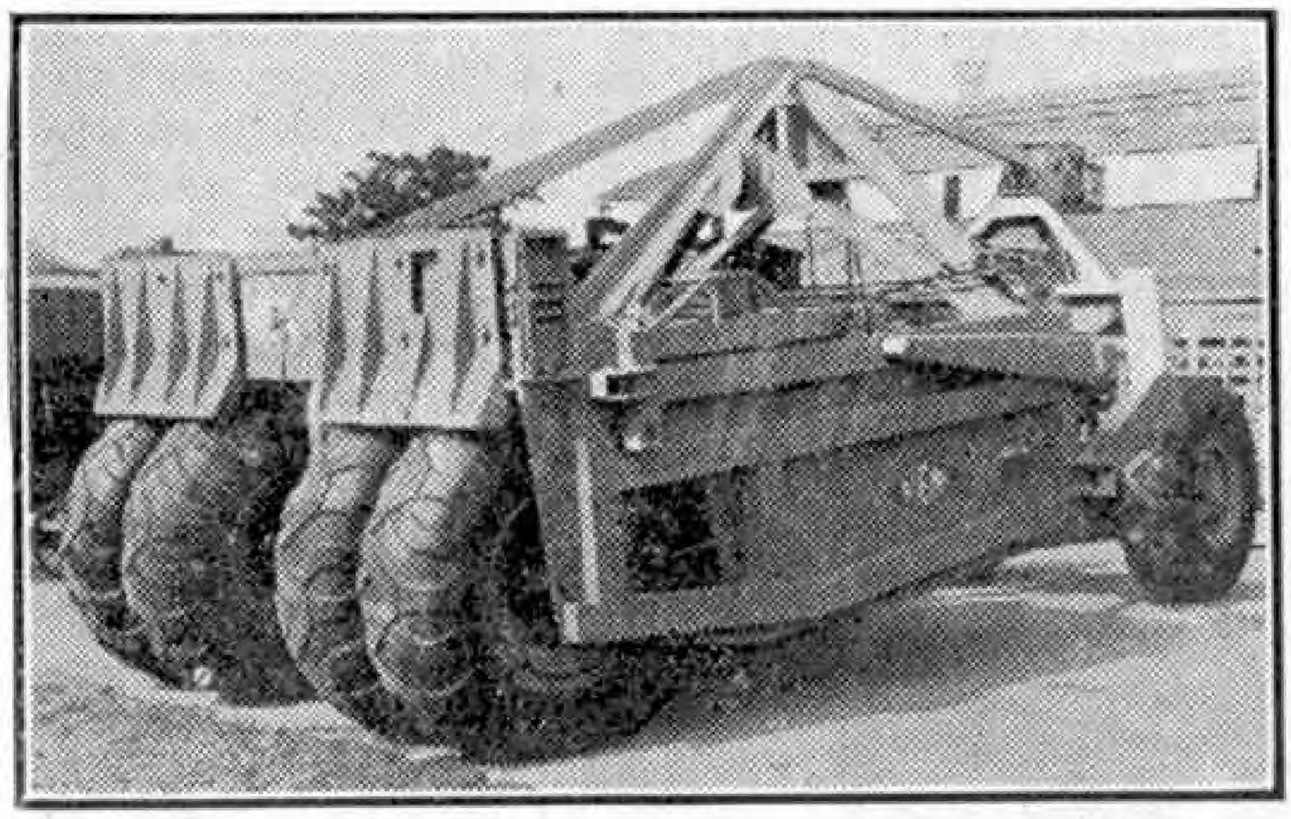
The important Howrah Bridge across the Hoogly in Calcutta was completed during 1942. This is of cantilever construction, and the only bridges of its type that are larger are the famous structures across the Forth and the St. Lawrence, at Quebec. It has a central span of 1,500 ft., with a roadway 71 ft. wide and two 15 ft. pathways. The cantilever arms stretching out towards the middle of the river are each 468 ft. in length, with anchor arms of 325 ft. each, and the suspended span connecting them is 564 ft. in length.

Another interesting bridge that has been completed during the past year is in Sweden and has a total length of about 14,700 ft. It has what is claimed to be the world's largest concrete span, of 886 ft., and its greatest height above the river it crosses is 131 ft. Its opening has eliminated the last ferry link on the road along the East Coast of Sweden from Stockholm to Haparanda, the most northerly town in the country.

The parts also have been completed for a South American bridge, of the transporter type, that is to cross a river on the boundary between Brazil and Bolivia, in the almost unexplored jungles of the central part of the Continent. The span of the bridge will be 1,185 ft., and the car that will move across between the supporting towers will be capable of carrying 80 passengers, or a 7-ton lorry. The towers themselves will be 100 ft. in height.



A Digma angledozer at work moving earth. The illustrations on this page are reproduced by courtesy of Blaw-Knox Ltd., London.



An impressive view of a Digma scraper, showing the giant tyres with which it is fitted.

Life-Light for Merchant Seamen

Early in 1940 the General Electric Company Ltd. introduced a jacket life-light as a help towards the rescue of merchant seamen from wrecked or torpedoed ships. This is issued to the passengers and crew of merchant ships, and its twinkling red light bobbing about in the sea provides a definite guide for rescuers in the event of disaster.

The life-light has been greatly improved as a result of experience. It is self-contained, consisting of a water-tight canister that is about the size of a standard torch, and is buoyant. Normally the switch is sealed, and the seal is broken when the base of the container is pressed sharply upward. This leaves a spring switch in action, so that the lamp can be used for signalling, and on pressing and twisting to the right the switch is placed definitely in the on position.

This simple mechanism can be operated quite easily by men wearing gloves, or with hands that are numbed, and in emergency it can be operated by one hand, pressing the case against the body. A strong lanyard is used to attach the life-light to the wearer, and it is conveniently carried in a pocket of a life-saving waistcoat, but it can be carried also in any pocket that is easy accessible.

A Giant Oil Pipe Line

A huge oil-carrying pipe, the largest in the world, has been laid in the United States for the transport of oil from Texas to the north and east. It is 550 miles in length and 2 ft. in diameter, and when pumping starts it will require 12 days to fill the pipe, which holds 3½ million barrels. It ends at present at Norris City in the State of Illinois, but an extension 857 miles long to the Atlantic seaboard is to be laid down. The pipe line will speed up the supply of oil to the northern and eastern States, and will relieve the tankers formerly used for this purpose. Its construction is a wartime measure, based on the obvious fact that, unlike a tanker, a pipe line cannot be sunk.

A trench 30 in. wide was necessary to accommodate the pipe, which was delivered in 40 ft. sections that were cleaned, coated with enamel, and wrapped with heavy asbestos-felt paper to protect them against corrosion before they were laid.

The oil will be driven through the pipe by pumps in 10 stations, placed at average distances apart of 55 miles, and it is expected that oil will be flowing by the time these words appear in print.

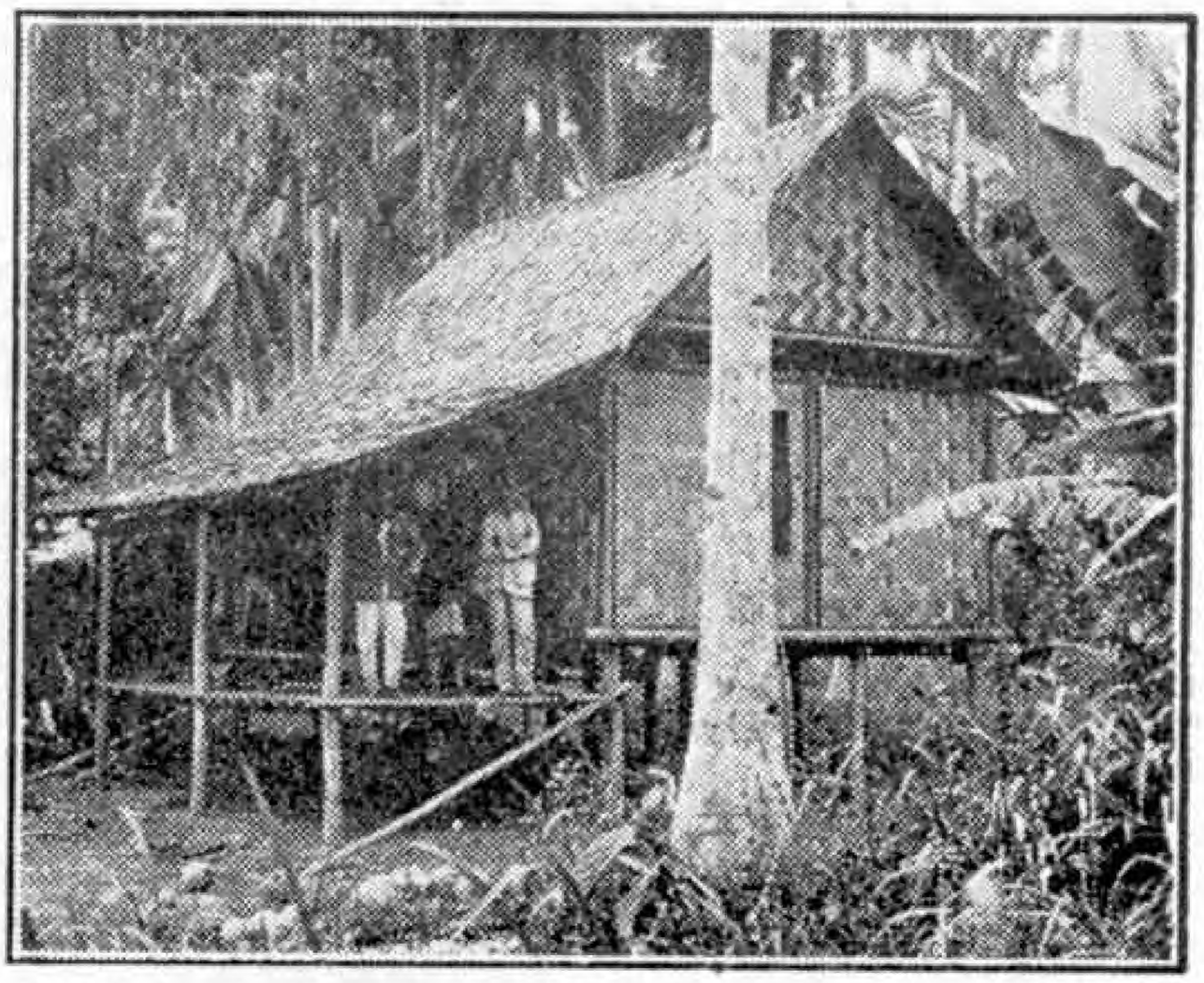
* * * *

During the past year the life-boats of the R.N.L.I. rescued 560 lives from shipwrecks round our coasts, and helped to save 43 boats and vessels from destruction. In the first 39 months of the war 4,886 lives have been saved by the life-boat service, more than in the previous 14 years of peace.

Of General Interest

Malayan Homes

The homes of other people are always interesting, and those of the Malay are no exception. A typical example is seen in one of the illustrations on this page. These houses are built of wood, with walls of interlaced bark strips, and they are raised a few feet from the ground. Strangers seldom pass beyond the verandah, an essential feature, but those who do usually find beyond it one large living room and a small kitchen. There is no furniture and no attempt is made at decoration. The plank floor is simply covered with mats made of rushes. Tidiness is not a characteristic of these homes, although there has been a great improvement in this respect in recent years. Fish bones and other refuse are dropped through slits in the plank floor, and ducks and fowls wander roundabout, with hens nesting underneath the houses themselves.



A typical native homestead in the jungle at Pulai Sulue, in Malaya. The illustrations on this page are by A. B. Williams, Birkenhead.

A Giant Indian Ocean Sting Ray

The lower illustration on this page shows a giant sting ray from the Indian Ocean. There are rays in most waters, but the sting rays may measure 18 ft. across. The one shown in our photograph is a giant, and it had a mouth like a cavern, as the further illustration on page 70 of this issue shows. The spine of the sting ray is barbed, and in consequence it is capable of inflicting very nasty wounds when it lashes its tail about violently. Some kinds of ray actually produce electric shocks that stun or even kill the smaller fish on which they feed. A shock from a powerful electric ray may even be strong enough to paralyse a man's arm for a time. The discharge is genuinely electric, for it is capable of magnetising a needle and of decomposing chemicals, exactly like current from a battery.

Stars We Never See

We usually think of the stars, including our Sun, as enormous masses of solid matter moving through empty space. Yet this space is by no means empty, for in it there are small pieces of matter, minute dust particles, atoms and molecules, electrons and protons; and although these are thinly distributed, space is so extensive that together they probably make up two or three times the quantity of matter found in all the stars put together. The stars themselves are at an average distance apart of about five or six light years. This is enormous, for a light year is the distance through which light travels in a year, and its speed is 176,000 miles a second. As far as we can see with the largest telescope now available, the entire universe has a diameter of about 600 million light years, but this may easily be doubled when the giant 200-inch telescope now under construction in the United States is completed.

It is interesting to realise how the existence of the enormous amount of matter scattered through space has been discovered. There are thousands of distant stars the light of which has never been seen. They are not revealed by photographs taken with ordinary photographic plates, and were not detected until plates sensitive to infra-red light were used. The waves of this light are longer than those of visible light, and because of this they pass through material that prevents the passage of light that affects our eyes.

Hauling a sting ray aboard in the Indian Ocean.

Tubes Made of Plastic

We are growing accustomed to the use of plastic materials for many purposes, and it is therefore not surprising to find that a plastic has been developed that can be used as a substitute for metal in the construction of pipes of 2 in. diameter or less. This material is called Saran. It is tough and non-inflammable, resists abrasion and is not affected by freezing, moisture or by heat up to 175 deg. F. It can be cut with an ordinary saw, welded, heated or bent, and threads can be cut on it with ease.

Welding Saran pipes is a remarkably simple operation. The pieces to be joined are placed with their ends on hot plates, at a temperature of about 350 to 400 deg. F., and left there until the material begins to melt. The pipe ends are then pressed firmly together and allowed to cool. A weld of this kind is completed in less than a minute.

Air News

New Types of Aircraft in Service

New types of British and American aircraft now in service are the "York" 4-engined transport, the D.H. "Mosquito" twin-engined, 2-seat reconnaissance bomber illustrated here and described briefly in the December 1942 "*Air News*"; the American Vultee "Vengeance" 2-seat dive bomber, and the Lockheed Vega "Ventura," a general reconnaissance monoplane developed from the well-known Lockheed "Lodestar" twin-engined transport.

Another recent British type of which mention can be made is the Bristol "Blenheim" V close-support attack bomber, designed for co-operation with ground forces. It has two Bristol "Mercury" engines, an unglazed nose to the fuselage, and modified undercarriage arrangements. This machine was for a time known as the "Bisley." It is in service with the R.A.F. in French North Africa.

A Year's Toll of Enemy Aircraft

No. 11 Group, Fighter Command, R.A.F., destroyed 500 enemy aircraft last year. The 500th victim was a Focke-Wulf Fw 190 which when sighted and chased went into a steep dive, failed to pull out, and crashed into the sea, without a shot being fired by its pursuer. This incident took place when "Spitfires" from the Group were providing fighter cover for "Fortress" heavy bombers returning from a daylight raid on Rouen. No. 11 Group is commanded by Air Vice-Marshal H. W. L. Saunders.

World's Largest Aero Engine Laboratory

The largest aircraft engine research laboratory in the world is under construction at Cleveland, U.S.A., for the National Advisory Committee for Aeronautics, a U.S. Government agency. It will cost about £4,500,000, and will include an engine research building and wind tunnel, a flight research hangar, and special buildings for research in fuels and lubricants. The equipment will be capable of testing aero engines and airscrews much bigger than those of to-day. The first portion of the plant includes the engine airscrew building, and has been completed a year ahead of schedule.

Heavy American Air Freight Traffic

Air freight traffic handled by United Air Lines, one of the big American air transport firms, has increased by 171 per cent. in a year, and the company have introduced a regular air freight service between New York and the Pacific coast. The freight is flown from New York as far as Salt Lake City in Douglas air liners adapted for this traffic by the removal of all passenger fittings, the strengthening of the cabin floor, and the installing of cargo-handling equipment. At Salt Lake City the freight is transferred to ordinary air liners for the final stage of the journey to San Francisco, San Diego, Portland, and Seattle.

* * * *

The SOP-I, the first all-metal glider produced in France, has been undergoing test flights. It is reported to have a top speed of 43–47 m.p.h. and to be specially suitable for aerobatics.

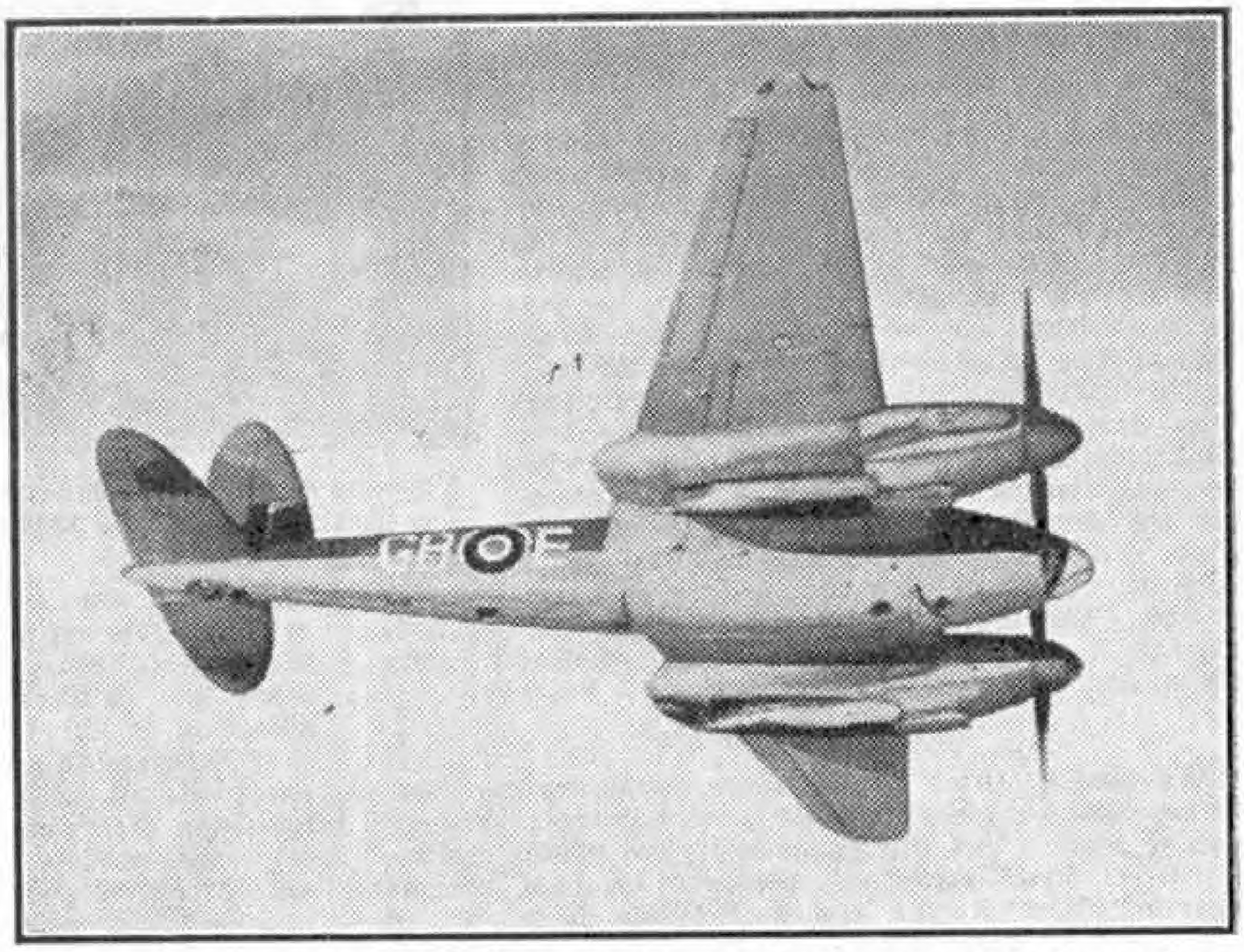
R.A.F. Squadron Transferred by Gliders

Recently the entire ground and clerical staff of a "Mustang" squadron of the R.A.F. Army Co-operation Command were moved from one airfield to another by gliders, in one hour. It was the first complete move of a squadron of "Mustangs" carried out in this way. The gliders were piloted by sergeant pilots of an Airborne Division and towed by the Command's twin-engined bombers.

"I knew little about gliders before this trip," said a member of the clerical staff of the squadron afterwards, describing the transfer. "I was a bit worried at first, but the cheerful confidence of the pilot soon reassured me. We airmen sat facing each other along the length of the body, and through the little port holes on each side we saw one after another of the 'tugs' being got ready for the take-off. Ropes were made fast, and with a roar the tug and the glider raced down the runway.

"We all quietened down when our turn came. The tow rope slackened and became taut alternately, then the noise and the bumping were replaced by a gentle swaying motion and a sound of rushing wind. We were airborne. 'If you feel ill,' we were told, 'there's a place in the rear'; we didn't. Soon we were circling the new airfield, the tow rope was released, and the glider nosed downwards. Then we flattened out, shivered, and bumped to a standstill."

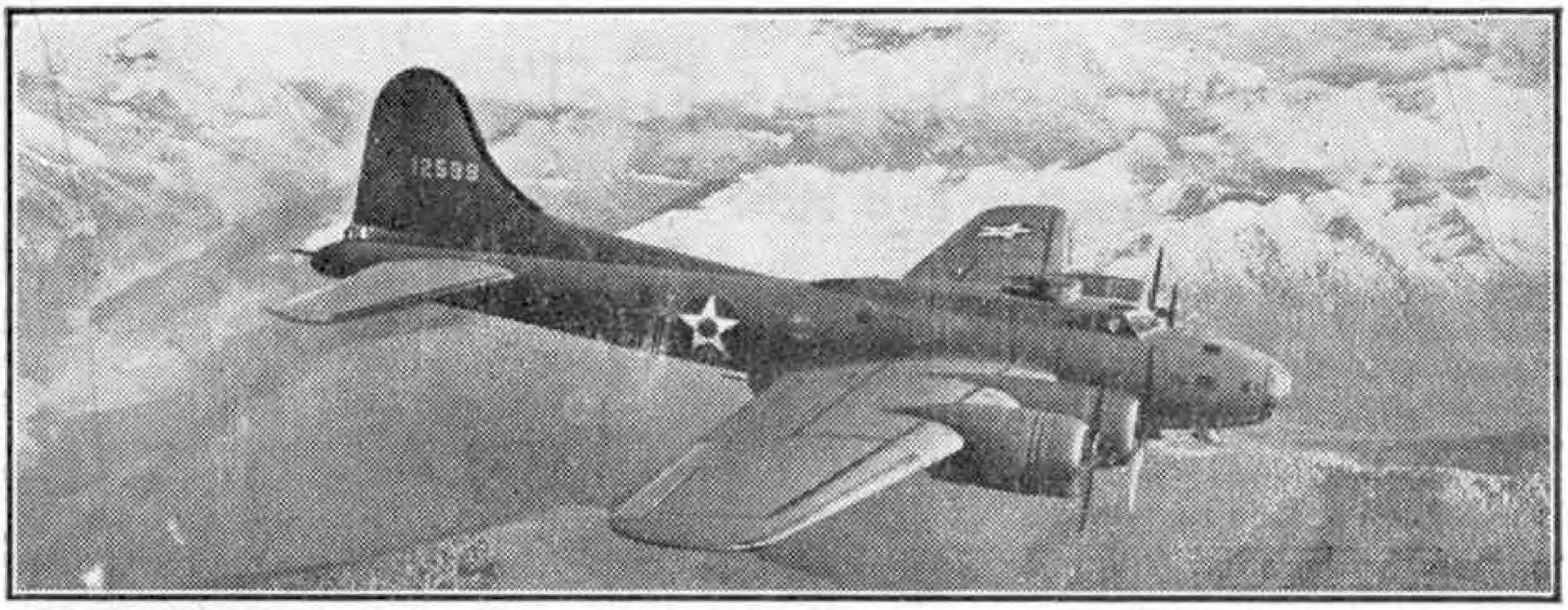
Ten minutes later the "Mustangs" arrived to find their ground crews waiting for them, complete with all the necessary equipment.



The de Havilland "Mosquito" reconnaissance bomber, the fastest aeroplane of its type in the world. The bomb load is carried in the wing centre section. Photograph "The Aeroplane" Copyright.

Malta News

A fine new aerodrome in Malta, with runways big enough for any type of R.A.F. and Fleet Air Arm landplane to use, has been opened by General Lord Gort, V.C., Governor of the Island. He officially handed over the aerodrome to Air Vice-Marshal K. R. Park, Air Officer Commanding, Malta, who then took off from the main runway in a "Hurricane" that he uses as an air taxi in the course of his duties.



A Boeing B-17E "Flying Fortress" heavy bomber over mountainous country. Photography by courtesy of the Boeing Aircraft Company, U.S.A.

"George" Does It!

"*George*," the automatic pilot, is a very valuable item in the navigating equipment of long-distance transport aircraft. It can take full control of the machine and keep it to any course the pilot desires, enabling him to leave the cockpit periodically to make an inspection tour of the machine. The following story from "*Empire Airways*," the journal of Qantas Empire Airways Ltd., Australia, shows that in an emergency "George" has achieved even greater things.

"After successfully completing their task the crew of an aircraft were homeward bound, anticipating hot co ee and a warm fire. The weather gradually became worse, night fell, and the wireless began to play tricks. The time for return became overdue and petrol had sunk to a dangerous low level. They were lost. The pilot considered a forced landing, but visibility ruled it out as almost certain disaster. They decided to jump for it. Before baling out, the pilot set 'George,' guiding the aircraft in the direction he imagined the sea to be, as an unmanned aircraft is a potential danger to any town in the vicinity.

"The aerodrome was nearer than the pilot imagined, and the Observer Corps picked up the aircraft overhead. Rockets and flares were sent up, but the strenuous e orts of the aerodrome staff were ignored. The aircraft continued on towards the coast. The staff had given it up as hopeless when the telephone rang in the control tower. An excited voice then informed the listener that an aircraft had made an almost perfect landing on a nearby beach—without a soul on board. 'George' had done it."

Record Flying Time of "Hurricane" Squadron

A "Hurricane" Squadron operating with the R.A.F. in North Africa is reported to have set up an operational record for December last year by flying a total of 1,557 hrs. 30 min. This squadron made history during the Battle of Britain by shooting down over 140 enemy raiders. It was the first squadron to arrive in North Africa, where it landed at an aerodrome near Algiers on 8th November 1942.

Meteorological Flying in Iceland

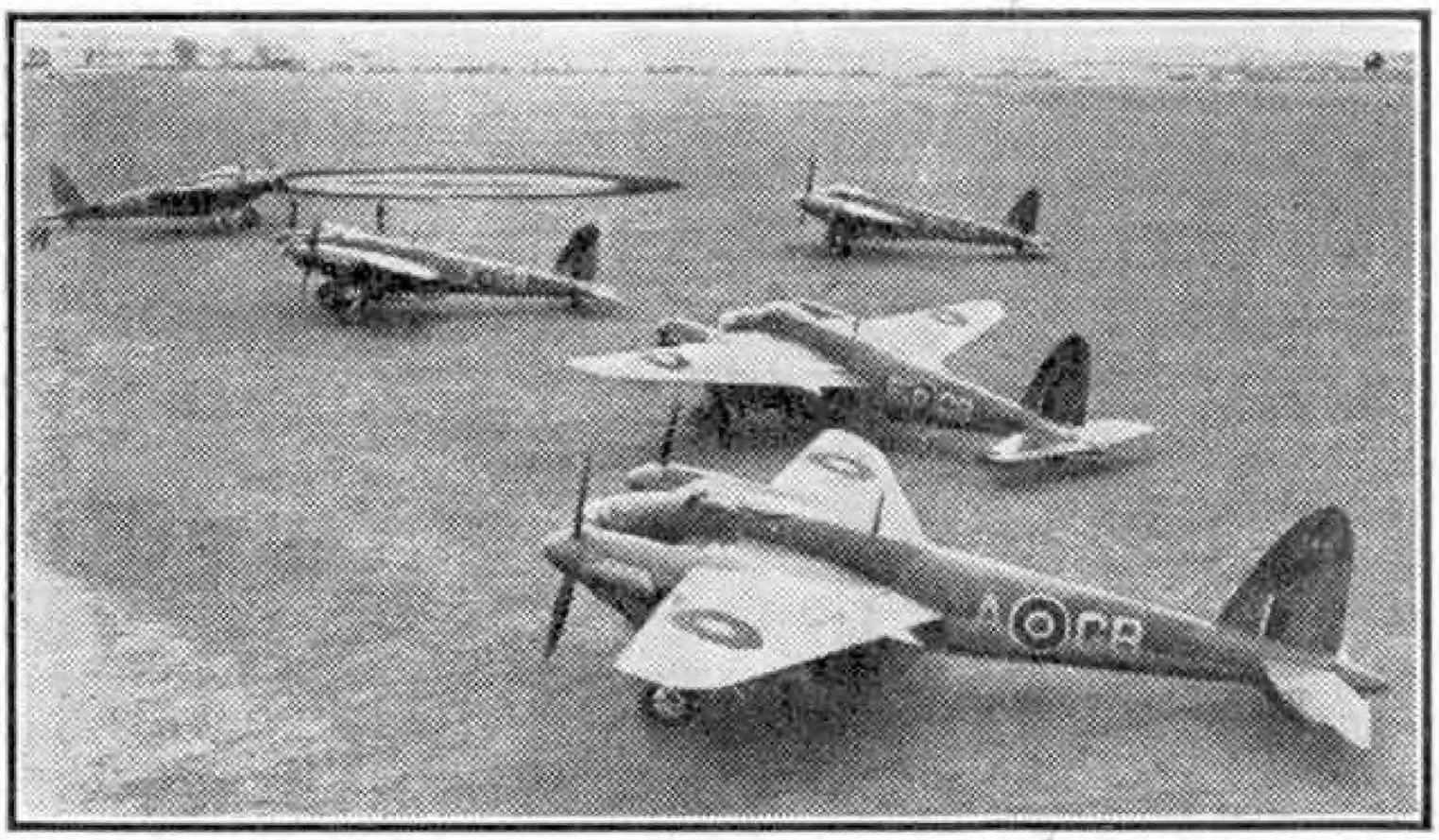
The R.A.F. Coastal Command Meteorological Flight based in Iceland has a fine record of service. In spite of fog and cloud the "Met." Flight aeroplane takes off except under the most extreme conditions, to chart the weather over a given course sometimes stretching hundreds of miles out to sea. Weather flying in Britain is difficult during the winter months, and in Iceland it is a task for only the most skilled pilots. Yet, during a recent month the "Met." Flight "Hudson" flew on 28 out of the 30 days. The pilots and aircrews employed on this work are specially trained, and there is perfect co-ordination between Captain and crew. It is this excellent team-work that enables the aircraft to fly under what would normally be considered "impossible" conditions.

Dangerous flights are usual during the winter months in Iceland. On one occasion a "Hudson" narrowly avoided a water spout that suddenly appeared out of the sea in front of its nose. Another time a "Met." aircraft iced up and spiralled almost out of control to 400 ft. before the pilot regained command, but he continued on his course and charted the weather. Sometimes the "Met." Flight is instrumental in saving aircraft out on patrol. Recently a weather aircraft 200 miles out at sea saw heavy cloud and squalls approaching Iceland at 50 m.p.h. The pilot signalled base, and all aircraft were recalled immediately. The last machine "touched down" only a few minutes before the squalls hit the island.

The Commanding Officer of this Iceland "Met." Flight is a young Flight Lieut. who formerly was an instructor on "Hudsons" for Ferry Command, at Montreal.

* * * *

A 110-ton flying boat is being designed by Mr. Glenn Martin, head of the Baltimore, U.S.A. firm who built the 70-ton flying-boat "*Mars*."



D.H. "Mosquitoes" in service with the Royal Air Force. Photograph "The Aeroplane" Copyright.

"Patent Fuel"

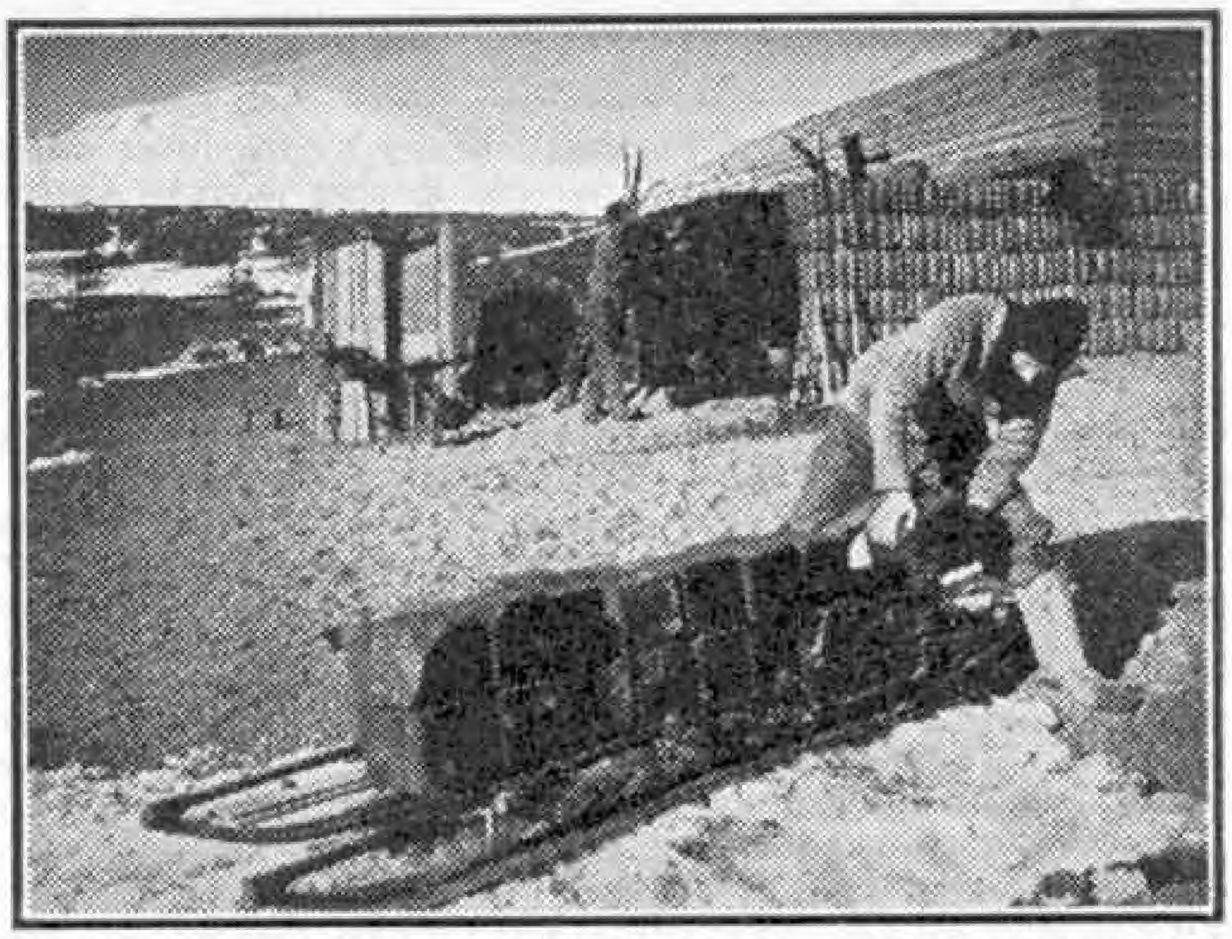
Briquettes and How they are Made

HERE is a South Wales industry, practically the whole of the product of which for over half a century was shipped abroad.

The Patent Fuel industry was started in 1849 by Mr. T. H. Wood of Briton Ferry, whose first idea was that small coal, which at the time was a drug on the market, should be bound together by some mechanical means so that it could be made into a coke for foundry and other purposes. Experiments were arranged and conducted by the Thames Iron Works, Milwall, London. While a satisfactory coke could be thus produced, it was soon found that by the admixture of coal with a small percentage of pitch, and the application of heat and pressure, a briquette could more easily be made that could be used as a substitute for large coal.

Success quickly followed, and in 1857 a works for the manufacture of "Patent Fuel" was erected at Port Talbot. This product was easily disposed of locally. A larger works, brought up to date, was then erected at Blackweir, Cardiff, with a view to developing an export trade. The rectangular blocks of fuel originally made weighed 28 lb., but those made at Blackweir weighed 56 lb. In course of time, it was found that blocks of 10 lb. and 28 lb. were more easily handled for loading, discharging and storing, and these sizes are retained at present.

As can be imagined, the methods of manufacture in the early days of the industry were very different from those adopted to-day. In the sixties, the moulds were filled by hand one by one. They

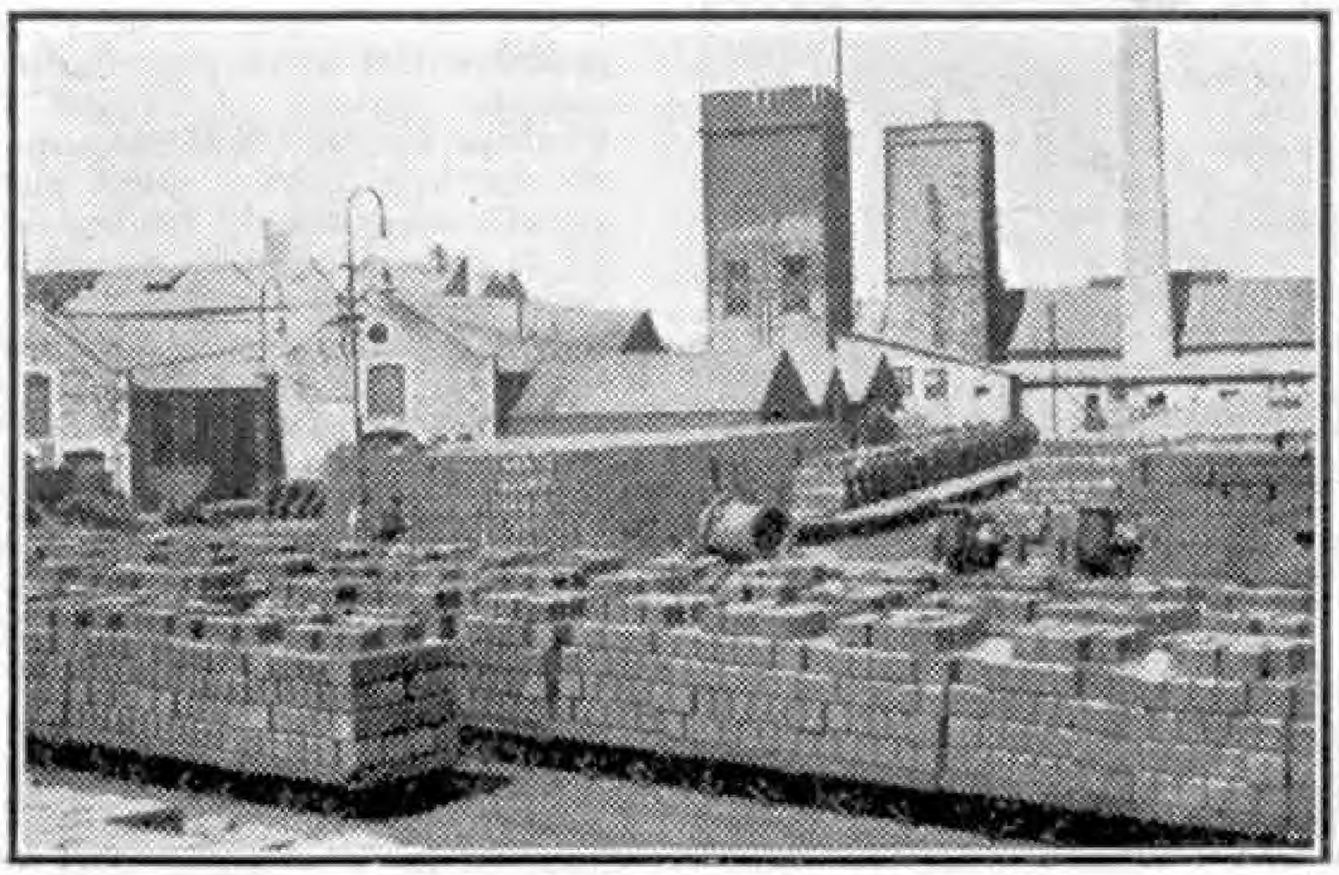


Capt. (now Admiral) E. R. G. R. Evans, unloading briquettes on Antarctic expedition. Our illustrations are by courtesy of the Editor, "The P.D. Review," issued by Powell Duffryn Associated Collieries Ltd.

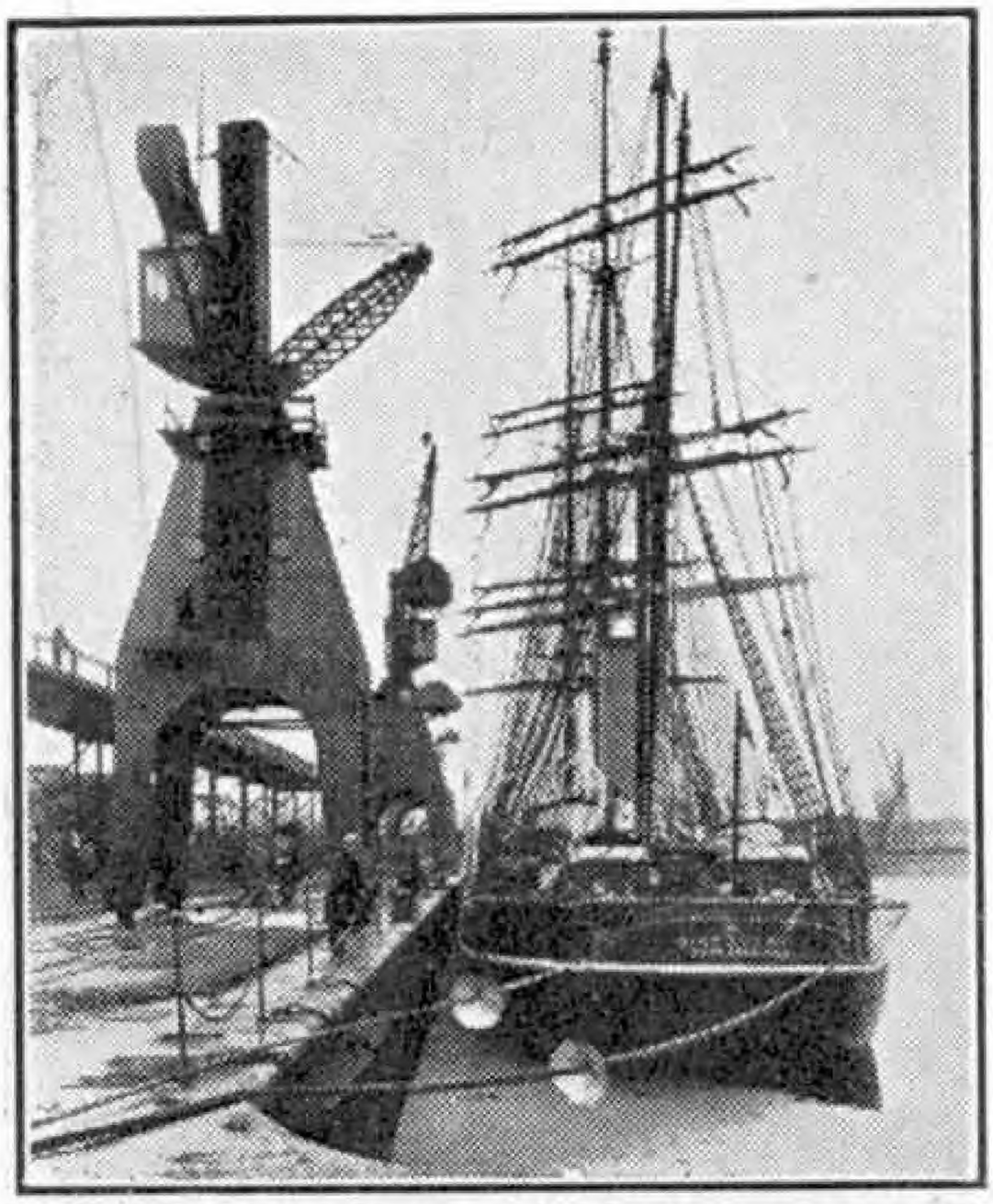
were then passed under the hydraulic press, and as they left were kicked free by a boy who was there all day for the purpose! Finally the blocks were loaded into wagons for local use, or into canal barges that were brought to the port of shipment, where they had again to be man-handled from the barge over the ship's rail and into the hold.

The industry has centred around South Wales ports chiefly because the quality of Welsh small steam coals is particularly adapted for the purpose. With the increase of export, the fuel works have latterly been constructed on the dock-side to facilitate shipment.

To ensure that only the purest coals are employed they are cleaned by a system of washing whereby extraneous matter such as shale, pyrites, etc., is separated from the coal itself. In this process the small coals are subjected to a flowing stream of water in a large tank known as



A view of the Briquette Works.



Capt. Scott's South Polar exploration ship "Discovery" alongside the wharf for loading briquettes.

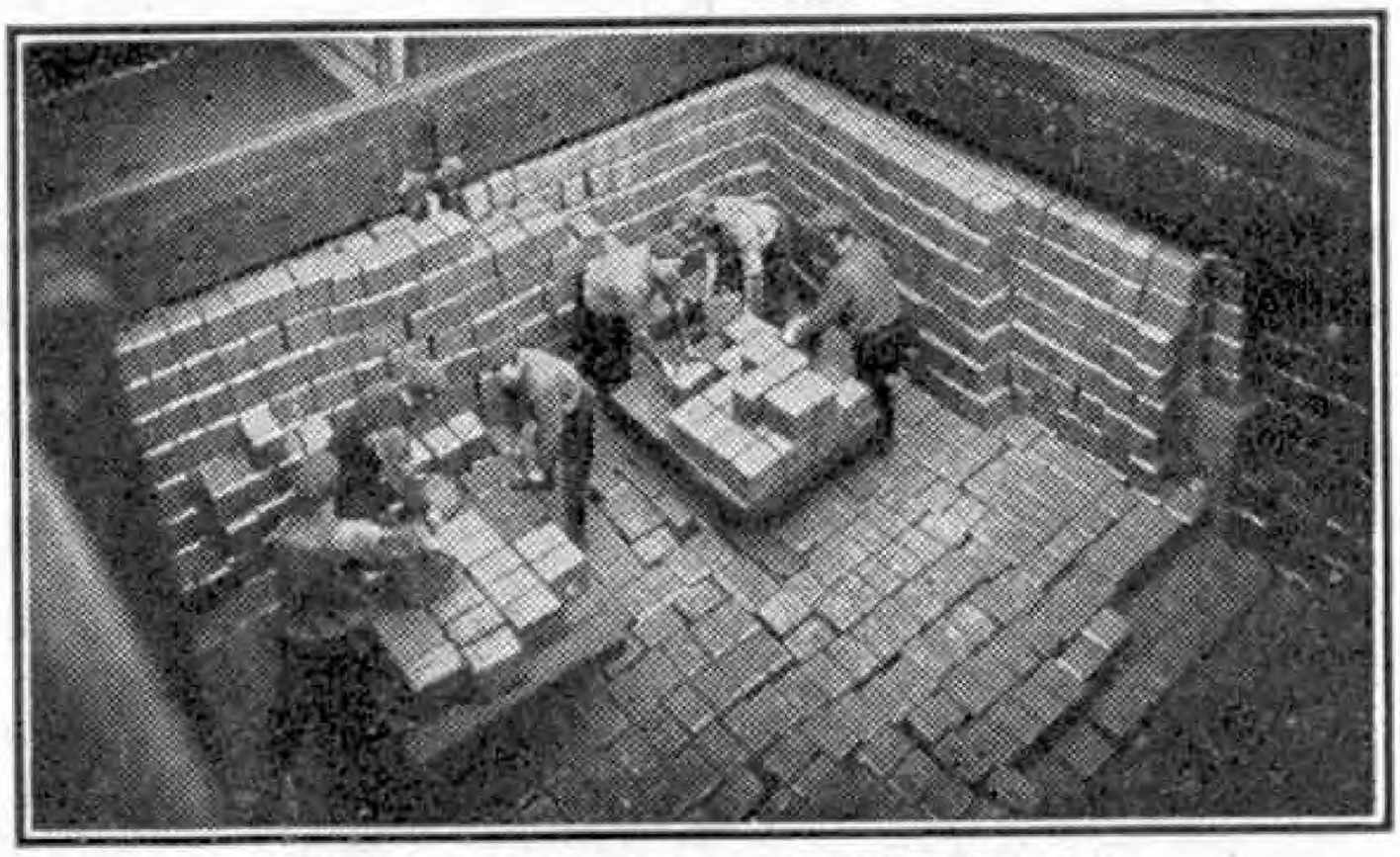
the "washbox," the water being made to pulsate up and down at such a rate as to cause the coal, which is lighter, to float onward, while the shale (slag), etc., being heavier, sinks to the bottom of the "washbox," and so is separated from the coal.

The coal, thus freed from impurities, is dried in large furnaces prior to being pressed into briquettes. In order to meet various requirements of industry, coals are divided into separate classes according to certain physical and chemical characters. The different types are then blended or mixed together according to requirements. If, for example, you heat a lump of anthracite coal on a red-hot fire, you will find that it produces intense heat, retains its shape, and gives no flame; at the other end of the scale bituminous and gas coals swell up and give off a big flame. The property which gives off flame is known as the volatile matter, and the various coals are classified according to their volatility.

The blended coal is now ground to a pre-determined size, and is mixed with the pitch, which has also been previously ground. Pitch is derived from coal, and is obtained from distilling coal tar until all creosote and other oils are given off, leaving a final residue of pitch which, at ordinary temperatures, is a hard, glossy, brittle solid, and fairly easily melted. The pitch-coal mixture is passed into large cylinders into which steam is injected, causing the pitch particles to melt and cover the coal particles. From the bottom of this cylinder, the hot plastic coal-pitch mixture passes into other appliances, in which the moisture, in the form of steam, is removed, and the temperature reduced to the condition requisite for moulding in the briquette presses. These presses turn out either a rectangular block-shaped briquette, or an ovoid (egg-shaped). The block-shaped briquettes are loaded straight away on to trolleys, while the ovoids are usually stored in bunkers, or in wagons. The trolleys containing the block form are picked up bodily in chain slings by means of cranes, and lowered into the ships' holds where men unload the trolleys.

In order to meet all industrial requirements, briquettes are subjected to strict analytical control right through the process of manufacture. They have to be made waterproof and impervious to extremes of climatic conditions, and no greater evidence of their efficacy in this respect could be given than that the Antarctic expeditions of Mawson, Shackleton and Scott all used briquettes as fuel and as walls to protect their animals from icy blasts. They retain their original heating power indefinitely and can be used wherever coal is used.

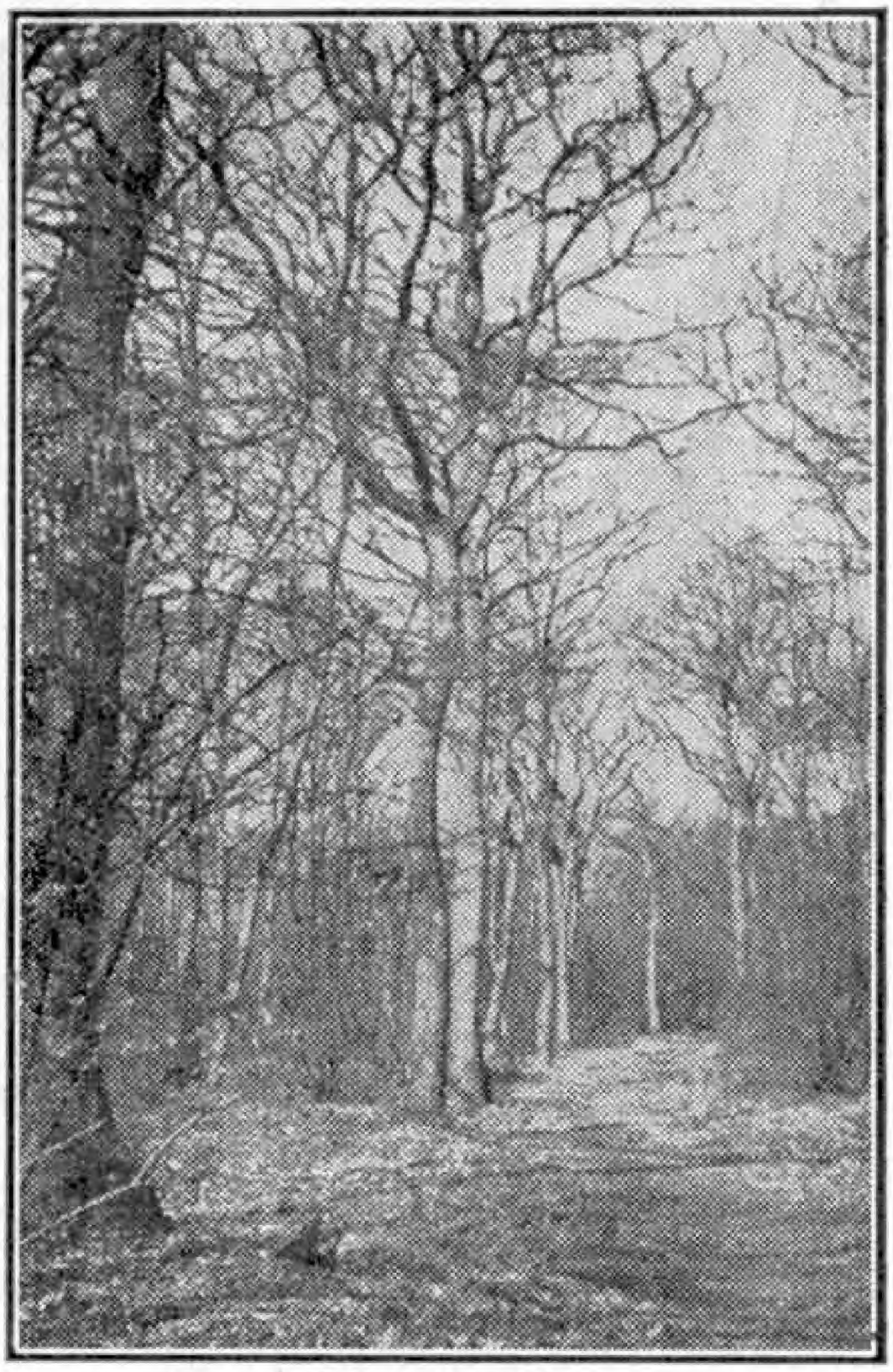
Their rectangular shape makes them extremely suitable for storage in the open or under cover, and in tests on railway locomotives they have given results even better than coal. Many South American and African railways run entirely on briquettes, and no railways have heavier gradients.



Stowing briquettes in the hold of a ship.

Photography in February

By A.R.P.S.



February woods.

TO the majority of amateur photographers February is the most disappointing month of the year for getting pictorial negatives. It seems to be neither winter nor spring; there is very little of either snow or sunshine; light values change every hour; and subjects, instead of presenting themselves, have to be sought. To the individual who is really keen on making a success of his hobby, however, it is these difficulties that make him think and strive a little harder to obtain something different from the ordinary type of photograph. By success I mean the acquiring of negatives that will give prints full of pictorial merit; prints that you will be proud to show to your friends. Perhaps you may even get one or two of them hung at a local exhibition, and what a thrill that is!

Let us think of outdoor subjects; it is time your camera got you out into the fresh air. Look at that avenue of trees, stately and majestic despite the absence of their green garments; study the reflections in the wet pools under the trees, and the suggestion of haze trying to hide the tops but not altogether succeeding. Why not have a shot? Step back a pace or two, look at the scene from the left as well as from the right. Maybe you will miss that ugly branch near the foreground if you go forward a few feet and lean against the trunk of that small tree on the right.

What about the exposure? Your camera lens has a stop marked F.8; you are using a fast film such as "*Selochrome*" or "HP2"; there is rather a heavy foreground and the haze rather overpowers the sun; it is between 12 and one o clock—under these conditions the exposure time would be approximately 1/75th to 1/50th of a second. If it is 3 o'clock, then you will have to give 1/25th, and this would be the time also if you used the smaller stop of F.11 at 12 o'clock. If the haze is very pronounced, with rays or flashes of light piercing the trees, give the increased time as for the smaller stop, but keep to F.8.

Do not leave it too late before returning home, and on your way up the old village street you may be lucky and get the westering sun throwing those long shadows from the churchyard trees across the old inn or the whitewashed cottages at the side of the Church. You might even have a shot at that little group of urchins sitting on the gate of the farm, which you go out of your way to pass on your return journey. It is getting well on in the afternoon, nearly 4 o'clock, and so you must increase the exposure time to not less than 1/25th or 1/10th with F.8.

There is one point you should note for this month; if you want "atmosphere," do not be afraid to use the large stop.

Now a word about developing these exposures. You will note in these talks of mine that I am really more keen on correct development than on very exact exposure. This is because I know there is a great deal of latitude in our very excellent sensitised material, whereas correct development is so very important, and at the same time so easy when you use the time and temperature method. I invariably use one of the developers that give development times in the directions, such as "*Azol.*" For the class of subject we have been discussing you want to aim at a soft negative, free from hard contrasts.

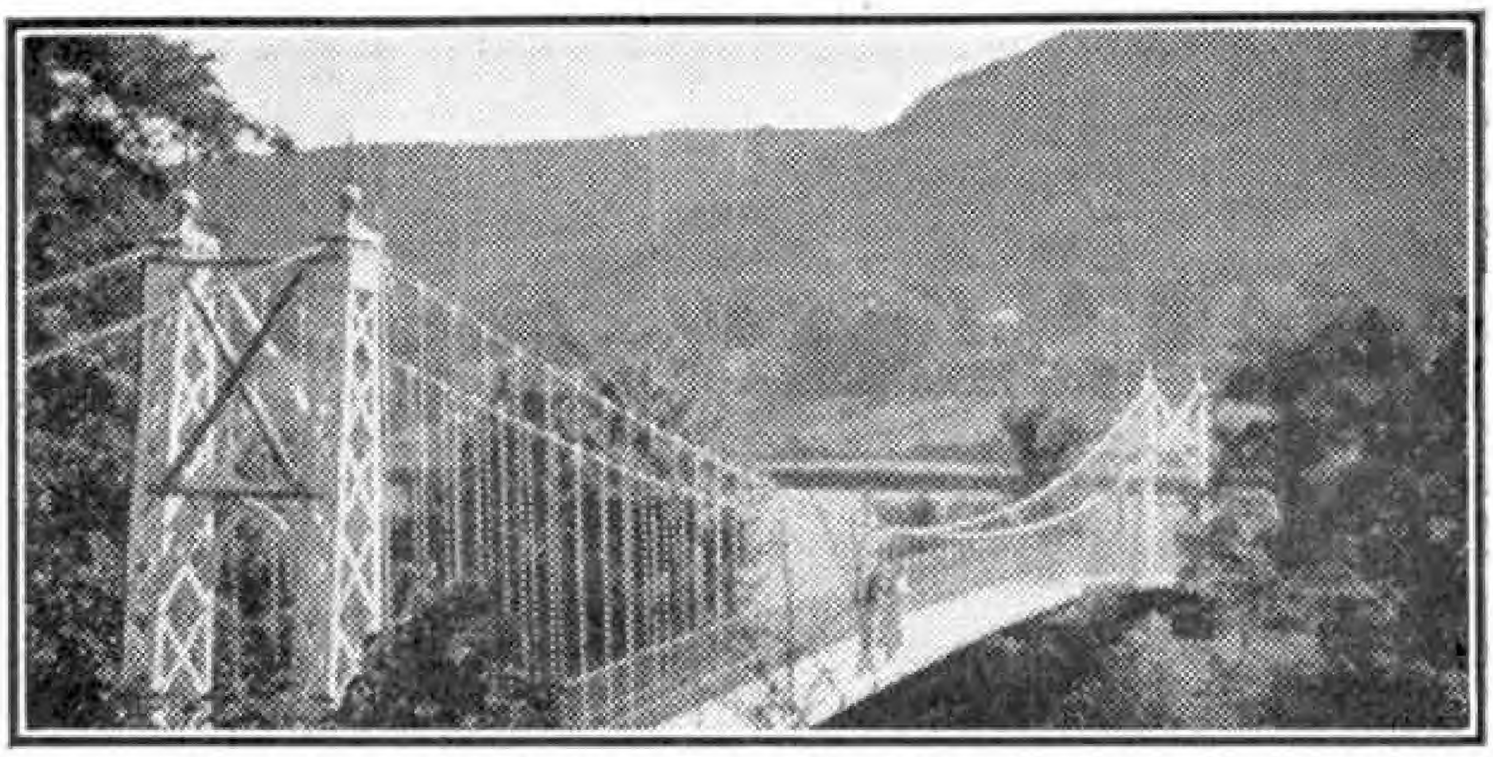
From Our Readers

This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

A PEDESTRIAN SUSPENSION BRIDGE

Sappers Bridge spans the River Conway just outside the little town of Bettws-y-Coed, in N. Wales. This bridge is a good example of suspension design presented "in miniature" and is of particular interest as it is for the use of pedestrians only. It was constructed in 1930 to replace a temporary bridge erected during the war period 1914-1918, and connects public footpaths on the two sides of the River Conway, thus forming a link between Caernarvonshire and Denbighshire.

D. KING (Catford).



A fine suspension bridge built to a small scale across the Conway River, North Wales. Photograph by D. King, Catford.

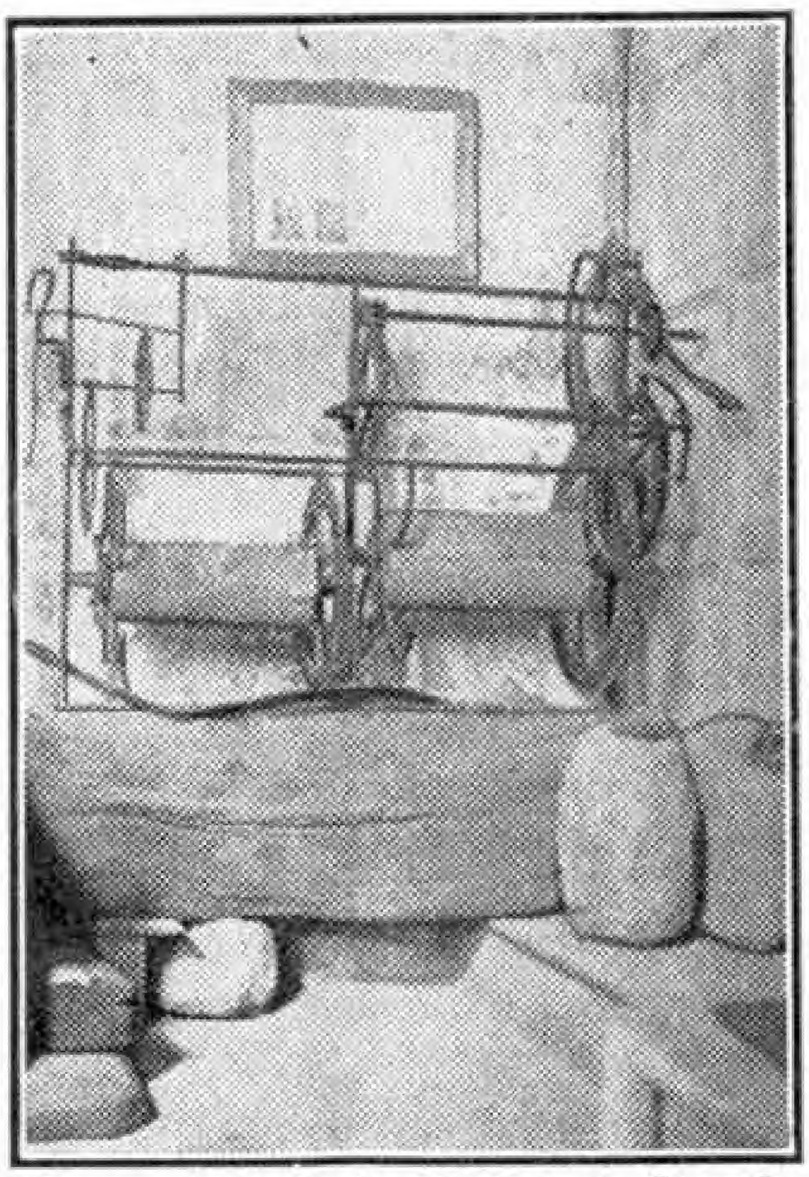
PORLOCK'S ANCIENT CLOCK

Near the belfry screen in the Somersetshire church of Porlock is one of the oldest clocks in England. It was probably given to the church in the early part of the 15th century by Lady Harrington. It is known to have been still working in the 1880's, and it was therefore in use for well over 400 years. It has neither hands nor face, and when working it "tolled" the time by striking the hours on the tenor bell. In design it resembles the ancient clock of Wells Cathedral, the works of which are in the Science Museum at South Kensington.

The frame stands 32 in. high and is 44 in. long. The drums for the cords supporting the driving weights are made of wood and are approximately 9 in. in diameter. The weights themselves are of stone, and are still existing, and they were wound up by means of four curved iron bars projecting from one end of each drum. The wheels are of iron, with large teeth. The frame carrying them is fixed to a massive block of hard wood, and the timing and striking movements are placed end to end, as seen in the accompanying photograph, and not side by side, as in modern clocks.

This fine old clock is well cared for. It has been given a good position inside the church, and behind it are photographs and a copy of notes on the clock by Dr. F. J. Allan.

F. W. FRENCH (Newcastle-under-Lyme).



The ancient clock of Porlock Church. Photograph by F. W. French, Newcastle-under-Lyme.

THE SMALLEST PARISH CHURCH IN ENGLAND

After rambling for about three miles along a narrow path that clings precariously to the hillside I came upon Culbone Church, near Porlock, Somerset, claimed to be the smallest parish church in England. This is situated in a narrow gorge about 400 ft. above the sea, and is so shut in that during winter months the rays of the sun do not touch it. The village of Culbone consists of a couple of cottages and the 33 seats in the church provide ample accommodation for the villagers. The building is only 33 ft. long by 12 ft. wide, but it has a nave, chancel, screen, font and even a porch. It was planned 800 years ago, and is built on the site of an old Norman hermitage. The gem of the church is a small window that was carved by the Normans.

The modern name of the church is that of the dedicatory saint, Culbone. It is the most peaceful church I have come across. The only sounds that can be heard inside it are the whisper of the wind in the trees and the babble of a stream that hurries down the ravine to the sea. The view, although limited, is fine, as the descending hills frame a strip of blue sea bounded in the distance by the coast of Wales.

P. E. MIDDLETON (Minehead).

THE CAPE PENINSULA ELECTRIC RAILWAY

One of the first South African railways to be electrified was the Cape Peninsula line, connecting Capetown and Simonstown. This is about 22½ miles in length, and its electrification was completed in 1930. Current is supplied through overhead cables and the trains are capable of 60 to 70 m.p.h., but there are too many stops to allow high speed running.

Among the famous places through which the line passes are Rondebosch, where the oldest mill in South Africa has ground corn for 140 years, Muizenberg, where Rhodes' cottage stands, and Kalk Bay, the harbour from which a fleet sets out every day to provide Cape homes with snoek, kabeljauw and other fish. Throughout there is always something interesting to see.

I. BENJAMIN (Germiston, S.A.).

Suggestions Section

By "Spanner"

(584) Crossbow

(J. Russell, Birkenhead)

A crossbow is shown in Fig. 584 on this page. It can be used to shoot small articles such as Bolts, Nuts or Washers, and can be adjusted to suit the range for which it is required by altering the length of the bow string. An interesting feature of the model is the catch that holds the sling containing the missile until this is ready for release, a simple mechanism that can be applied with advantage in other Meccano models.

The bow is formed of two 5½" Strips strengthened at the back by an additional 5½" Strip, which is bolted to two 2½" Double Angle Strips bolted together and attached at their rear ends to two Trunnions.

The object to be shot out of the bow is fitted on a Flat Bracket 1 which, together with an Angle Bracket and two further Flat Brackets 2, is bolted to two Angle Brackets that slide on the Double Angle Strips. The shank 3 of the Bolt connecting these projects upwards so that it catches on a Flat Bracket 4 that is bent slightly at its tip to form a catch. This is fitted to an Angle Bracket lock-nutted to one of the 2½" × ½" Double Angle Strips

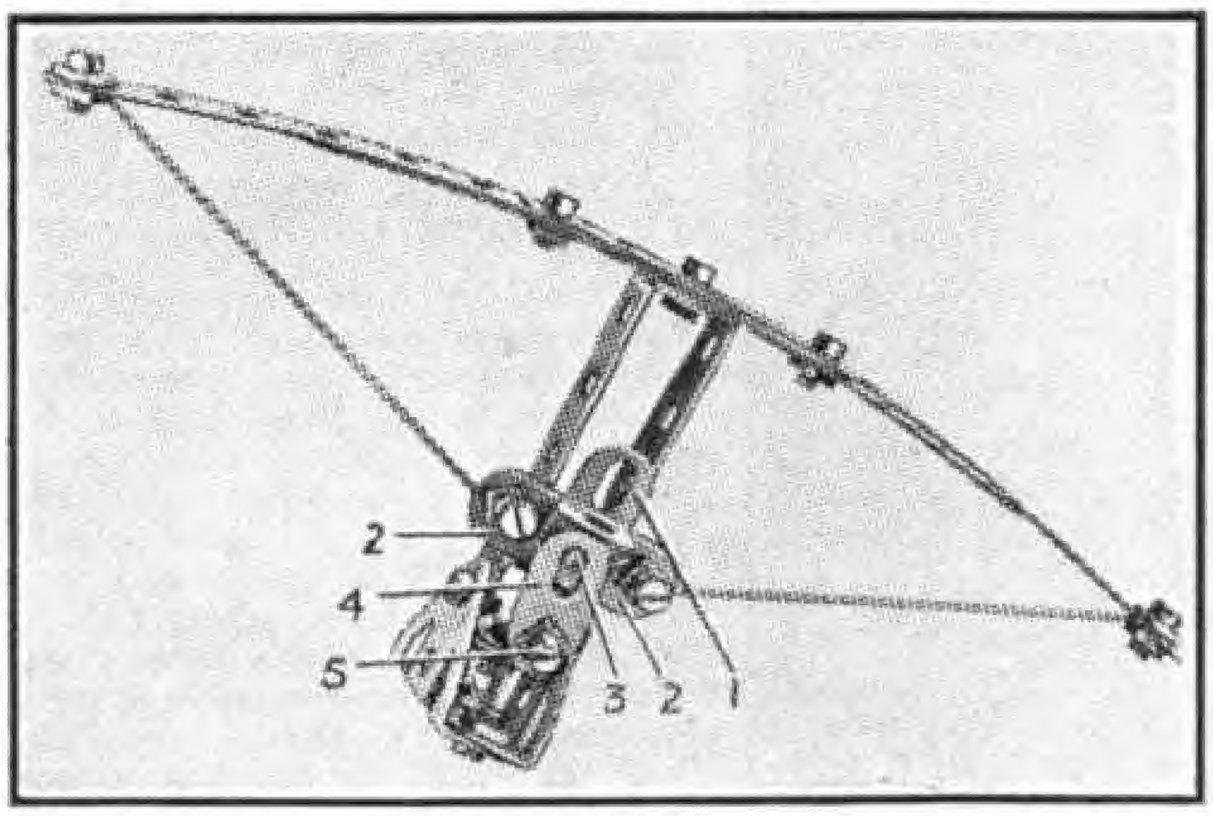


Fig. 584.

by a Bolt 5, which forms the trigger and is spaced by a Nut for easier manipulation.

The Flat Brackets 2 are now fitted with short lengths of string or Cord by means of two ⅜" Bolts, which also provide grips for reloading. The other ends of the

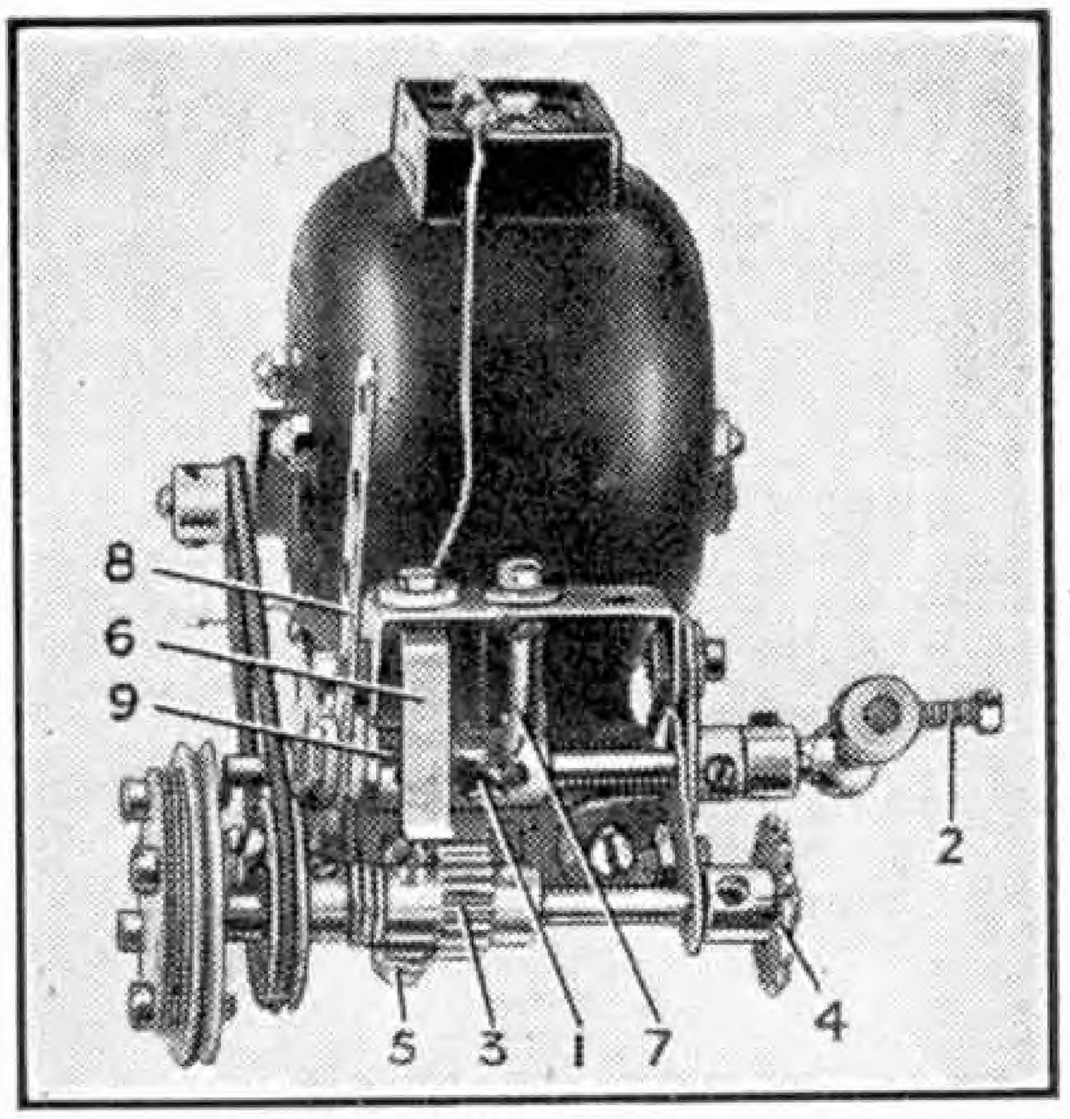


Fig. 585.

strings are fitted to the ends of the bow by means of Bolts fitted with Washers secured to the outer ends of the latter, and when the weapon is being reset the cords draw back the ends of the bow.

(585) Kick-Starter for Motor Cycles

(T. Roberts, Hull)

The inclusion in model motor cycles of the mechanism shown in Fig. 585 will help greatly to make these very realistic. The rack segment used in real kick starter mechanisms is here represented by a Centre Fork 1 that is fitted in a Coupling, attached to the starting pedal 2. The Centre Fork is so adjusted that it engages the teeth of a ½" Pinion 3 that is loose on the shaft driven from the engine. In the model this is represented by an E06 or E020 Electric Motor, the drive being carried through the Motor pulley and a 1" Pulley on the shaft, which are connected by a 6" Driving Band. This shaft also carries the flywheel, formed from a 1½" Pulley to which are bolted several 1¼" Discs, and transmits the drive to the clutch and gear-box through a ¾" Sprocket 4. It is journalled in 1" Corner Brackets that are bolted to 1½" similar Brackets, which also provide the bearings for the compound shaft on which the foot pedal is secured.

The 1½" Corner Brackets are also attached to 2½" × ½" Double Angle Strips that are fitted to a 2½" × 1½" Flanged Plate on which the Motor is secured, but from which it is insulated. The ½" Pinion is fitted with a Bolt 5 spaced by two Nuts,

and the Bolt makes contact with a Pendulum Connection 6 insulated from a $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip joining the $1\frac{1}{2}''$ Corner Brackets. This Pendulum Connection is joined to one terminal of the Motor, the other terminal of which is connected to the current supply, together with a wire taken from the frame of the model.

The foot pedal is spring-loaded so that on depressing and releasing it at the end of the stroke the pedal springs back into its normal position. A short length of Spring Cord 7 is used for this purpose; it is connected at its upper end to the $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip and at its lower end it is fitted to the front end of the Centre Fork, as in the illustration.

A lever 8 to cut out the Motor is provided by a $2\frac{1}{2}''$ Strip connected to a Flat Bracket by an insulated $\frac{1}{2}''$ 6 B.A. Bolt 9. The Flat Bracket is lock-nutted to the left-hand $1\frac{1}{2}''$ Corner Bracket, the $\frac{1}{2}''$ 6 B.A. Bolt making contact with the Pendulum Connection 6. Thus on operation of the lever the Pendulum Connection is raised out of possible contact with the Bolt 5.

(586) A Simple Pantagraph for Copying Drawings (H. Jones, Cardiff)

Fig. 586 shows a simple pantagraph, an instrument designed for copying drawings and maps. It consists of strips pivotally connected together, and carries a tracer point and a pencil. When the tracer point is moved over the lines of a drawing, the pencil automatically reproduces its movements, and by suitably adjusting the relative position of the pencil and tracer point, the copies produced may be made either larger or smaller than the original or, if desired, of the same size.

The instrument shown in Fig. 586 consists of a framework built up of two $12\frac{1}{2}''$ Strips pivoted to two $5\frac{1}{2}''$ Strips. The two opposite corners of the parallelogram so formed are attached by Bolts, locked together with Handrail Supports in Threaded Bosses, which form supporting legs. At one of the other two corners is a small piece of a

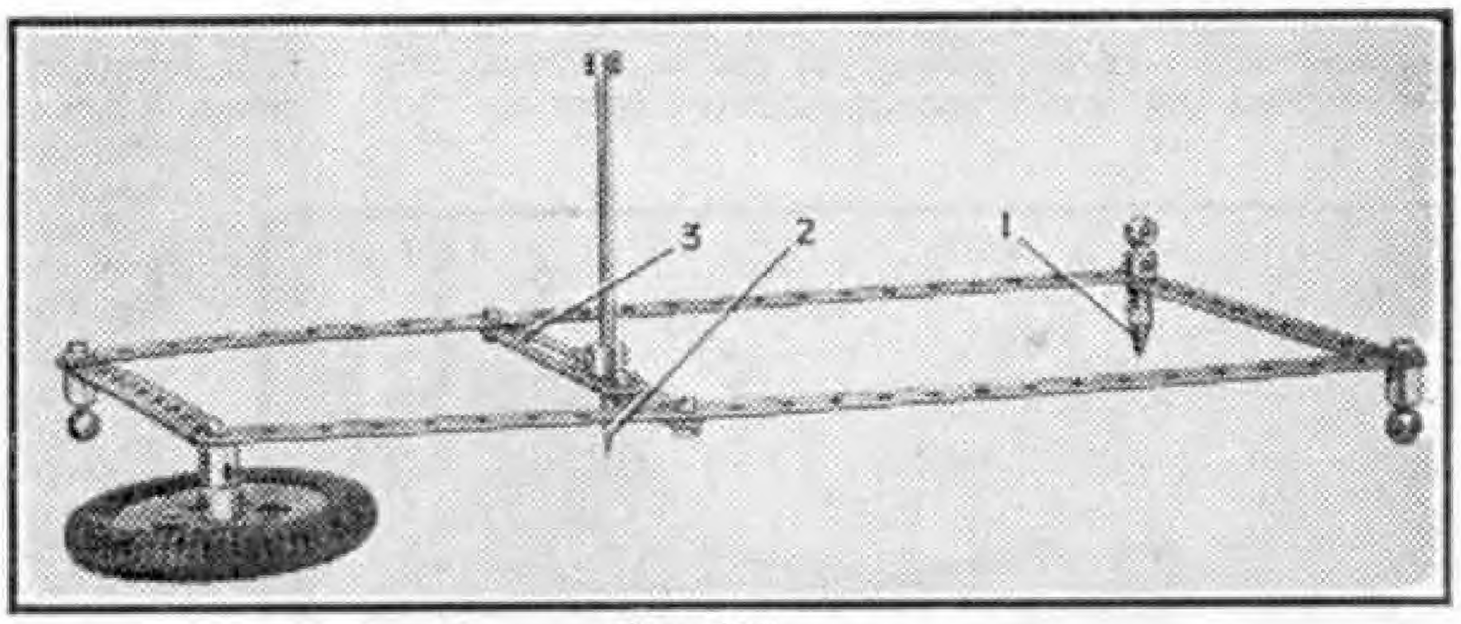


Fig. 586.

pencil 1, which is gripped in the casing of a Spring Buffer fitted with a Bolt locked at its upper end in a Handrail Coupling. The remaining corner is anchored to the drawing paper by a $\frac{3}{4}''$ Bolt gripped in the boss of a 2" Pulley fitted with a Motor Tyre and spaced by a Threaded Boss.

The pointer 2 consists of a Drift locked in a Double Arm Crank bolted to a $5\frac{1}{2}''$ Slotted Strip 3 and fitted with a Collar. This Strip may be lock-nutted in various positions in corresponding holes of the $12\frac{1}{2}''$ Strips, so that the size of the copy may be varied. In each position in which the latter Strip is fitted, the Double Arm Crank that carries the pointer must be adjusted so that it is in a direct line between the centre of the pivot of the instrument on its base and the pencil.

If the instrument is required to produce a copy smaller than the original drawing, the positions of the pencil and the pointer should be transposed.

(587) Creeper Track ("Spanner")

Fig.587 shows a novel and efficient type of creeper track, which is built of Dinky Builder parts.

Each track is made up of 18 Dinky Builder Small Squares, hinged together by Dinky Builder $1\frac{1}{16}''$ Rods. When incorporated in a model the tracks run around Meccano driving "sprockets" consisting of Pulley Wheels fitted with Dunlop Tyres; and in the example shown one 3" Pulley and a 2" Pulley are used for each track. The axles of the Pulleys are $5\frac{1}{2}''$ apart.

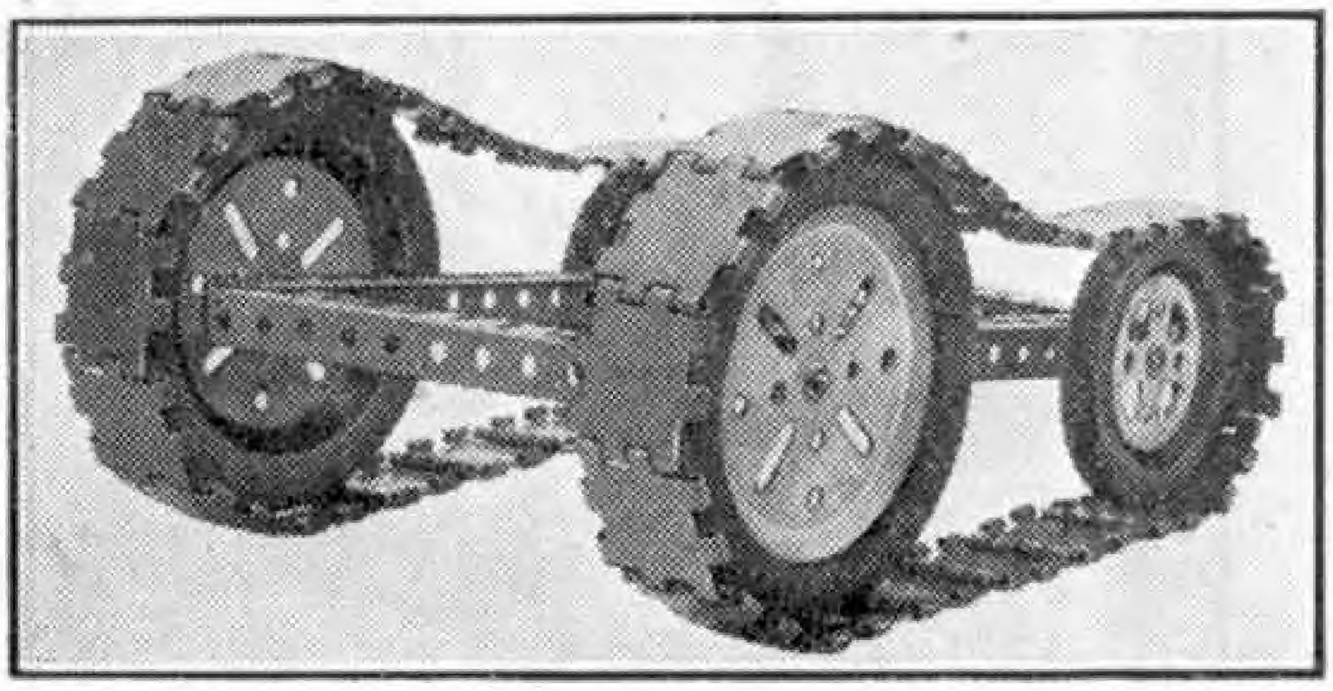


Fig. 587.

New Meccano Models

Miniature Pioneer Locomotive—Monoplane

OUR first model this month is the miniature of a famous early locomotive seen in Fig. 1. This was built on Tyneside in 1804 in accordance with the plans of Richard Trevithick, the famous Cornish engineer who was the pioneer of the locomotive. In the original the power was transmitted from the fly-

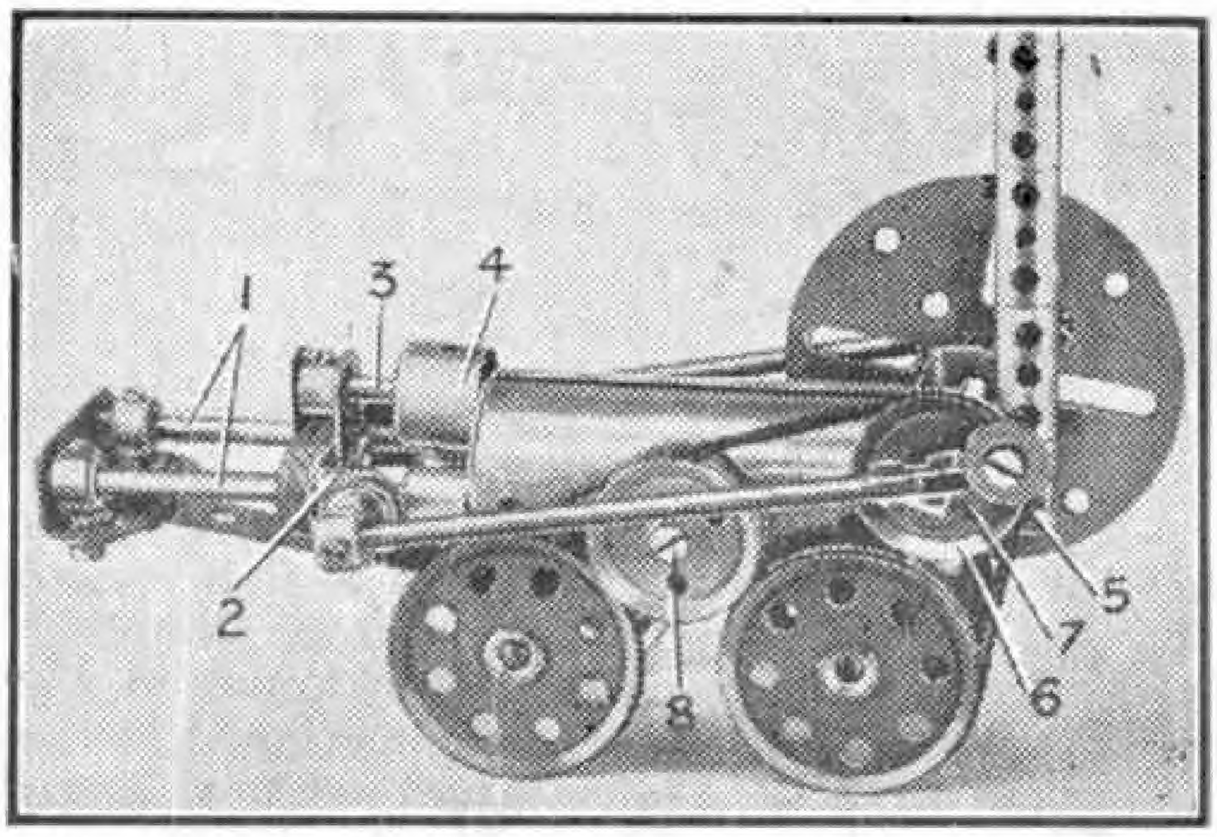


Fig. 1. A fine Meccano version of a pioneer locomotive.

wheel shaft to the travelling wheels through a system of large gears, but in the model belts are used for this purpose.

Construction of the model is commenced with the cylinder and slide bar assembly, which is fixed at the rear of the boiler. The slide bars 1 are 2½" long, and are held at their forward ends in the bosses of Rod Sockets attached to a 1¼" Disc forming the boiler end. A crosshead guide 2 is fitted on the bars, and consists of six 1½" Strips bolted to a 1½" × ½" Double Angle Strip, to which Collars are lock-nutted. The piston rod 3 is 2½" long, and is held by a Collar between two Flat Brackets attached to the crosshead. It is free to slide in a Chimney Adaptor 4 that forms the rear section of the cylinder, and in the top hole of the 1¼" Disc. The Chimney Adaptor is bolted to a Collar, but is spaced from it by a Washer. In one of the tapped bores of the Collar is fixed a 3" Screwed Rod that passes along the centre line of a Cylinder forming the boiler.

The rear ends of the slide bars 1 are inserted in Collars connected as shown and braced by a 3" Strip fixed to the rear end of the Cylinder.

The travelling wheels are 1½" Pulleys mounted on 1½" Rods journalled in Double Brackets bolted underneath the Cylinder. Two 1" loose Pulleys are mounted on a ½" Bolt 8 fixed to the Cylinder in the position shown. The front end of the boiler is a 1¼" Disc to which are bolted a ½" × ½" and a 1" × ½" Angle Bracket that provide bearings for the flywheel shaft. The 1¼" Disc is held in place by a Threaded Coupling 5, which is screwed on the 3" Screwed Rod passing through the centre of the boiler.

The chimney is a 3" Rod inserted in the Threaded Coupling 5 and fitted with three Couplings and a Collar. The flywheel is a Face Plate, and it is mounted on the left-hand end of a 2" Screwed Rod that carries at its other end a 1" fixed Pulley 6 and a Flat Bracket 7 locked between two Nuts. A Rod and Strip Connector is lock-nutted to the Flat Bracket and another to the corresponding hole in the Face Plate.

The drive is transmitted to the wheels by a 10" Driving Band passed around the 1" Pulley 6 and also around the forward right-hand travelling wheel, over the inner 1" loose Pulley and around the rear wheel. It is returned to the Pulley 6 after passing over the outer 1" loose Pulley. The mechanism of the model is completed by fitting the connecting rods, which are 3½" Rods attached as shown.

Parts required to build model Locomotive: 1 of No. 4; 6 of No. 6a; 1 of No. 9f; 3 of No. 10; 2 of No. 11; 1 of No. 12; 1 of No. 12b; 2 of No. 16; 3 of No. 16a; 1 of No. 16b; 2 of No. 18a; 4 of No. 21; 1 of No. 22; 2 of No. 22a; 22 of No. 37a; 8 of No. 37b; 27 of No. 38; 1 of No. 48; 7 of No. 59; 3 of No. 63; 1 of No. 63c; 1 of No. 80c; 1 of No. 81; 1 of No. 109; 1 of No. 111a; 4 of No. 111c; 1 of No. 164; 2 of No. 179; 1 of No. 186b; 2 of No. 212; 1 of No. 216; 2 of No. 217a.

Our second new model this month is a trainer monoplane, which is based on the well-known Miles "Master" and is designed for construction from Outfit No. 3. It is shown in Fig. 2 and construction is commenced with the nose and fuselage. A U-section Curved Plate 1 is fitted with a Double Bracket, to which is bolted a Flat Bracket. The propeller, consisting of two 2½" Cranked Curved Strips held between two ¾" Discs, is lock-nutted to the Flat Bracket by a ½" Bolt. At its rear end the U-section Curved Plate is attached to two 2½" Flexible Plates 2. These are bent around and bolted together underneath the fuselage, and are also attached to a 5½" × 2½" Flexible Plate 3 forming the cockpit and the rear part of the fuselage. The Plates are strengthened by the addition of 5½" and 2½" Strips curved slightly and bolted in the positions shown. At the rear end, the fuselage is attached to two Trunnions 4 and is strengthened by the addition of two ½" × ½" Angle Brackets which join the two sides. The Trunnions are fitted with 2½" × 1½" Flexible Plates forming the tailplanes, and carry a ½" loose Pulley.

The fin and rudder unit is fitted, and each wing is attached to the fuselage by Angle Brackets; 2½" Strips fitted with 1" Pulleys form the undercart.

Parts required to build model Trainer Monoplane: 6 of No. 2; 9 of No. 5; 5 of No. 10; 1 of No. 11; 6 of No. 12; 2 of No. 22; 1 of No. 23; 43 of No. 37a; 37 of No. 37b; 4 of No. 90a; 5 of No. 111c; 2 of No. 126; 2 of No. 188; 2 of No. 189; 2 of No. 190; 1 of No. 192; 1 of No. 199; 1 of No. 214; 2 of No. 217b.

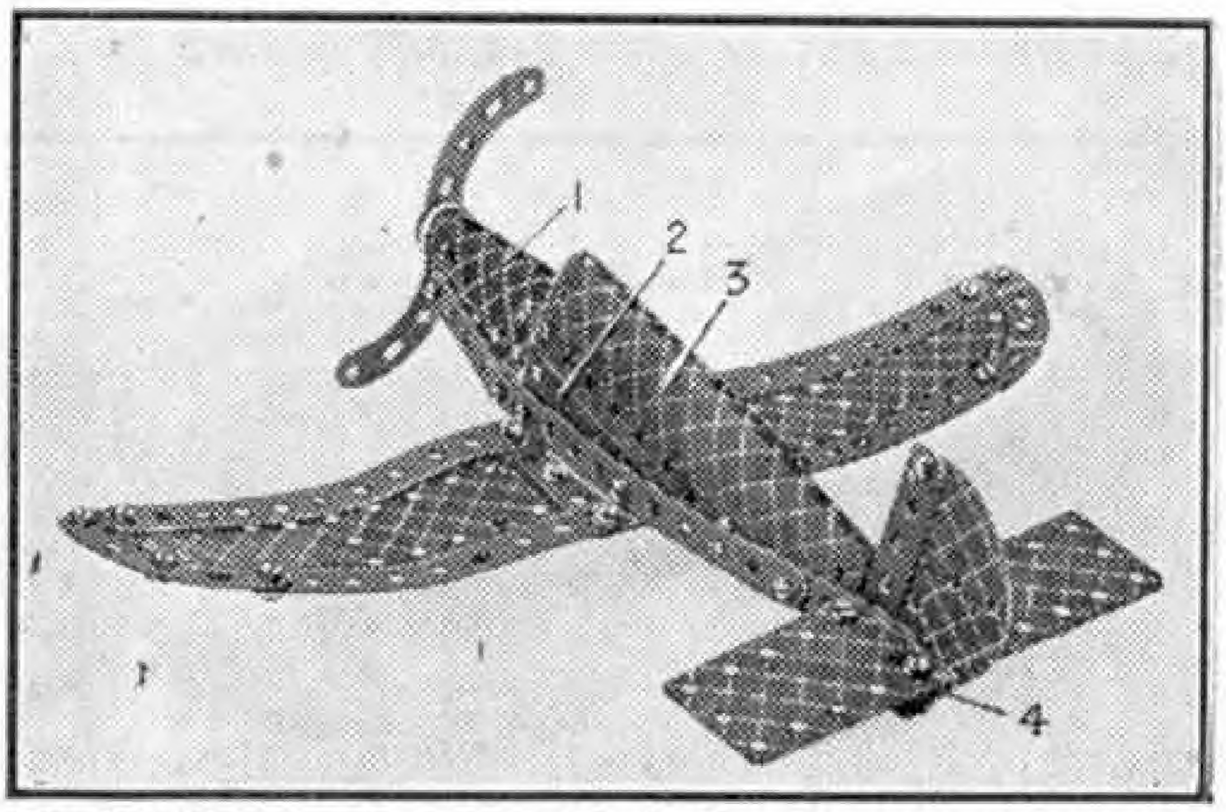


Fig. 2. This aeroplane model is built with parts included in Outfit No. 3.

Meccano Model-Building Competitions

By "Spanner"

Our "New Year" Contest

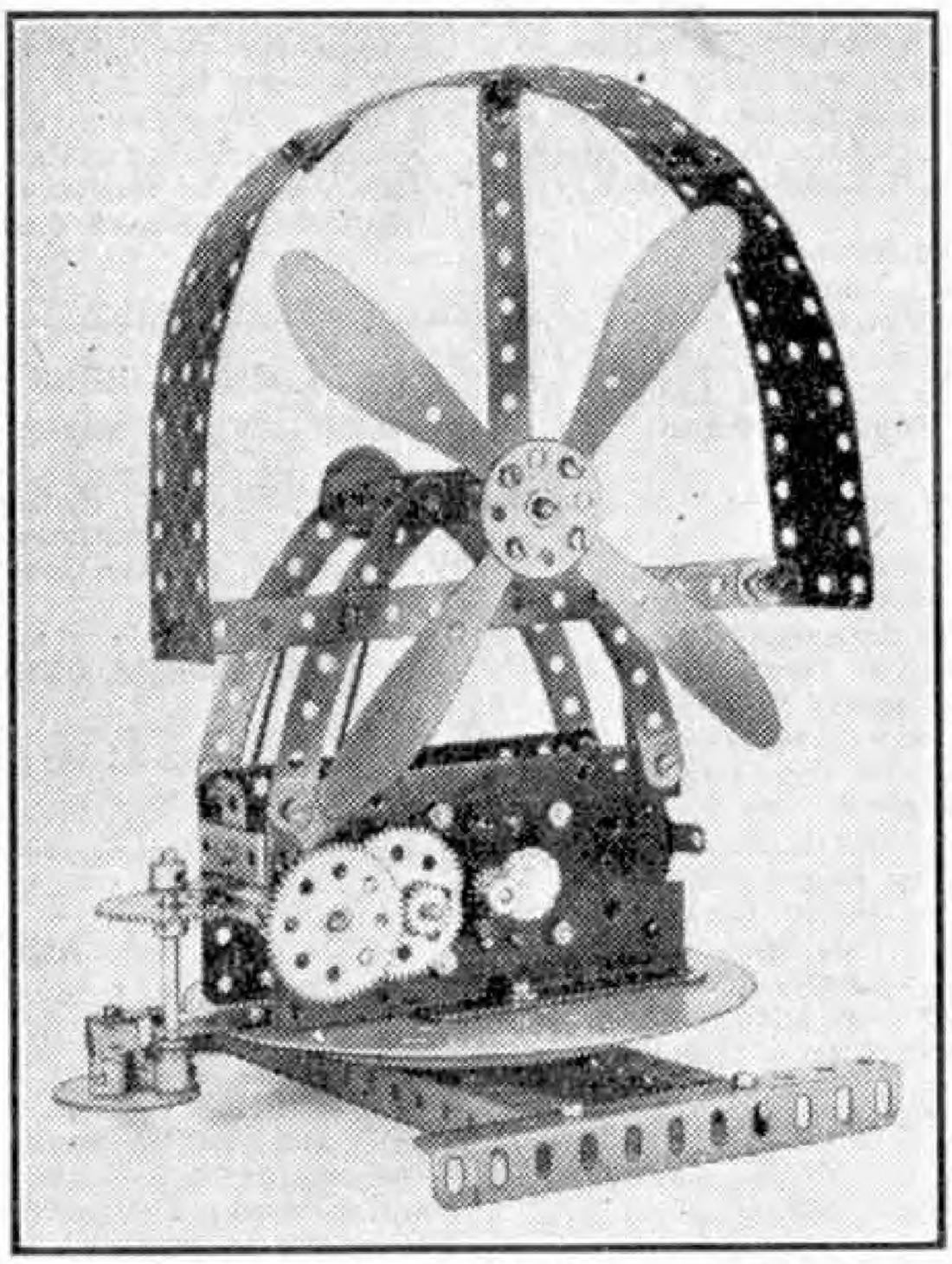
There is plenty of time for model-builders to win one of the many handsome cash prizes offered in our "New Year" model-building contest. Entries may be models of any size or type whatever, and there is a special section for those under 14, while the judges will take the ages and resources of competitors into consideration when making their decision.

Ingenuity in the use of parts and general realism will be looked for rather than mere size. Any competitor who wishes to send in a group of models may do so, but these will be regarded as a single entry. No models are to be sent in; a good photograph or drawing only is required, together with any special explanation that may be necessary. The name, address and age of the competitor must appear on the back of each sheet of his entry, which should be addressed *"New Year Model-Building Contest, Meccano Limited, Binns Road, Liverpool 13."*

Entries will be divided into two sections. Those from readers of 14 years of age or more will be placed in Section A, and those from competitors under 14 in Section B. The closing date is 31st March.

The following prizes will be awarded in each Section of the Contest:

First, cheque for £2/2/–. Second and Third prizes will consist respectively of cheques for £1/1/– and 10/6. There will be also five further prizes, each consisting of a Postal Order for 5/–, and Certificates of Merit for other good entries.



A fine model of an electric fan that won a prize in the "September" Model-building Contest for R. C. Smith, Hawera, New Zealand. Results in this competition are announced on this page.

September Model-Building Competition Results

The prize-winners in the "September" Model-building Contest were as follows:

Section A.—1st Prize, Cheque for £2/2/–: M. A. Reed, Woodford Green; 2nd, Cheque for £1/1/–: J. Nowlan, Dagenham; 3rd, P.O. 10/6: C. S. Burney, Addlestone. P.O. value 5/–: R. C. Smith, Hawera, N. Zealand; F. Violett, Kenton; N. Forrester, Scarborough; S. Reid, Aberdeen; W. Hogbin, Ramsgate.

Section B.—1st Prize, Cheque for £2/2/–: J. H. Smith, Teddington; 2nd, Cheque for £1/1/–: F. Rowland, Hazel Grove; 3rd, P.O. for 10/6: A. Short, Birmingham. P.O. for 5/–: P. A. Walters, Billericay; A. Foster, Birmingham 23; D. Clarke, Exeter; M. Davies, Harrow; W. Ralph, Pulborough.

A fine automatic horizontal milling machine is the subject of the entry of M. A. Reed. This is fitted with self-acting feeds and is powered by an E6 Electric Motor acting through two three-speed gear boxes to provide the various movements. The details of gearing and control are well thought out, and construction is excellent.

J. Nowlan submitted a unique collection of models based on the machines used in the laboratory of a paint manufacturers. These include mixers of various types and a scratch-test apparatus, in which an electric lamp lights up when the needle used in the test penetrates the paint.

Third Prize in Section A was awarded to C. S. Burney for a selection of models including a sturdily-constructed model tank and an interesting aero-car. The tank is fitted with a driving motor and Sprocket Chain forming the creeper track is tensioned by two front Sprockets mounted in spring-loaded bearings. The aero-car is powered by an E06 or an E020 Electric Motor, which drives a large propeller mounted on a vertical pillar secured to the car chassis.

The model electric fan illustrated on this page was submitted by R. C. Smith, and incorporates an interesting movement that causes the stream of air produced to cover a large area. An E6 or E20b Electric Motor drives the fan at high speed and also rotates an Eccentric that is anchored, so that it turns the superstructure backward and forward over a wide area.

The models here described were entered in A Section. Details of prize-winning models in B Section will be given next month.

Club and Branch News

WITH THE SECRETARY

TOPICAL PROGRAMMES FOR INTEREST

Present-day programmes must be full of variety and interest, and this can best be achieved by making them topical. All boys are fascinated by aircraft, and these can be made the centre of many really enjoyable evenings by encouraging the building of Meccano models of famous types. It is a great day in the story of a Meccano Club when a large fleet of miniature aircraft, representative of the most famous of those flown by Allied airmen, can be set up for inspection by members and by friends invited to see what they can do. Competitions and aircraft recognition tests also provide real fun, and there is genuine interest in the making of small models in wood or balsa, if this can be obtained, or even in match sticks, as the members of the Aircraft Section of the Exeter M.C. have shown.

The programme should not be confined to aeroplane modelling. Tanks, fire engines and lorries also provide exceptionally good subjects that are topical, and in many Clubs the greatest interest will be taken in the reproduction of ships of the Royal Navy and of the Merchant Navy.

MERIT MEDALLIONS IN 1942

As usual I give a list of winners of Merit Medallions during the past year. The Club members named have thoroughly earned the distinction, and I congratulate them all. The list is shorter than usual, partly because Leaders of all active Clubs have not taken full advantage of the award for the recognition of good work. Another difficulty has been that in most Clubs many older members, those particularly qualified by long service or official activities, have gradually found their way into the Forces. This leaves the way clear for the younger members, many of whom have done so well for their Clubs that they deserve the highest honour. Leaders should keep this in mind. In many cases it would be a good thing to reserve for younger members one of the two Merit Medallions available each Session.

Proposed Branches

NEWCASTLE-ON-TYNE—Mr. J. Gate, Welbek Road, Walker, Newcastle-on-Tyne.

LONDON—Mr. T. W. Hancock, Downhills Central School, Tottenham, London N.15.

LEEDS—Mr. A. M. Cohen, 18, Stainburn Avenue, Leeds 7.

LONDON—Mr. R. Wood, Forest School, Nr. Snarsbrook, London E.17.

Recently Incorporated Branches

437. GUISELEY—Mr. W. L. Myers, 6, Ashtofts Mount, Guiseley, Nr. Leeds.

438. HOMELEIGH—Mr. N. M. Pontefract, "Homeleigh," Station Road, Wellington, Somerset.

439. KINGS SCHOOL, MACCLESFIELD—Mr. J. E. Turner, "Chandypore," Woodford Road, Poynton.

440. MILL STREET AND SAINT OWEN—Mr. H. Williams, 59, Mill Street, Hereford.

Club Notes

TYNECASTLE M.C.—Meetings of the new Session have brought excellent attendances, and there is special interest in the construction of flying model aircraft. A new feature is Physical Training, which is carried on at the close of each Model-building Evening and is greatly enjoyed. Pole flying demonstrations and practice continue. Club roll: 20. *Secretary:* R. Paterson, c/o Campbell, 221, Gorgie Road, Edinburgh 11.

BARNARD CASTLE SCHOOL M.C.—There has been great activity. Practically every member constructed models for the Club Exhibition, and among these was a very fine magic lantern, a traction engine and trailer, a seaplane and vehicles of various kinds. A Meccano shunting device has been built for use on the Club's Hornby Railway. Club roll: 10. *Secretary:* F. Boardman, Barnard Castle School, Barnard Castle.

MERIT MEDALLIONS AWARDED IN 1942

EXETER—D. J. Blatchford, D. Clarke, A. Curtis, C. Godbeer, K. J. Hole, F. Casley, J. Cory, E. Greenslade. HORNSEA—O. P. Loten. LONDON (Acton)—J. H. Statham, F. T. Mothersole. (Clapham Common)—T. W. Stenning, H. G. Board. WHITEFIELD (Hillside)—D. Johnson.

OVERSEAS CLUB MEMBERS

AUSTRALIA (Maylands, Perth)—R. Wood, P. Lindau. SOUTH AFRICA (Malvern, Johannesburg)—D. Edden, C. Carson.

AUSTRALIA

THEBARTON M.C.—A brief outline of the Club's history, given by Mr. E. S. H. Gibson, M.Sc., Leader, aroused the interest of new members. Many subjects discussed have included the action of wheels, machine guns and electric clocks. Films have been enjoyed, and competitions have included estimating weights and distances, finding jumbled names of Meccano Parts and tests in general knowledge. Club roll: 55. *Secretary:* T. Hearn, Thebarton Technical School, Ashley Street, Thebarton, Australia.

Branch News

GAINSBOROUGH—The Branch Track has been constructed and given a realistic appearance. Members are overcoming the difficulty of adding new rolling stock by constructing van-tops to fit on flat trucks. A Branch Magazine is issued; each issue includes details of an L.N.E.R. engine class. *Secretary:* F. T. Newman, 26, Birrell Street, Gainsborough.

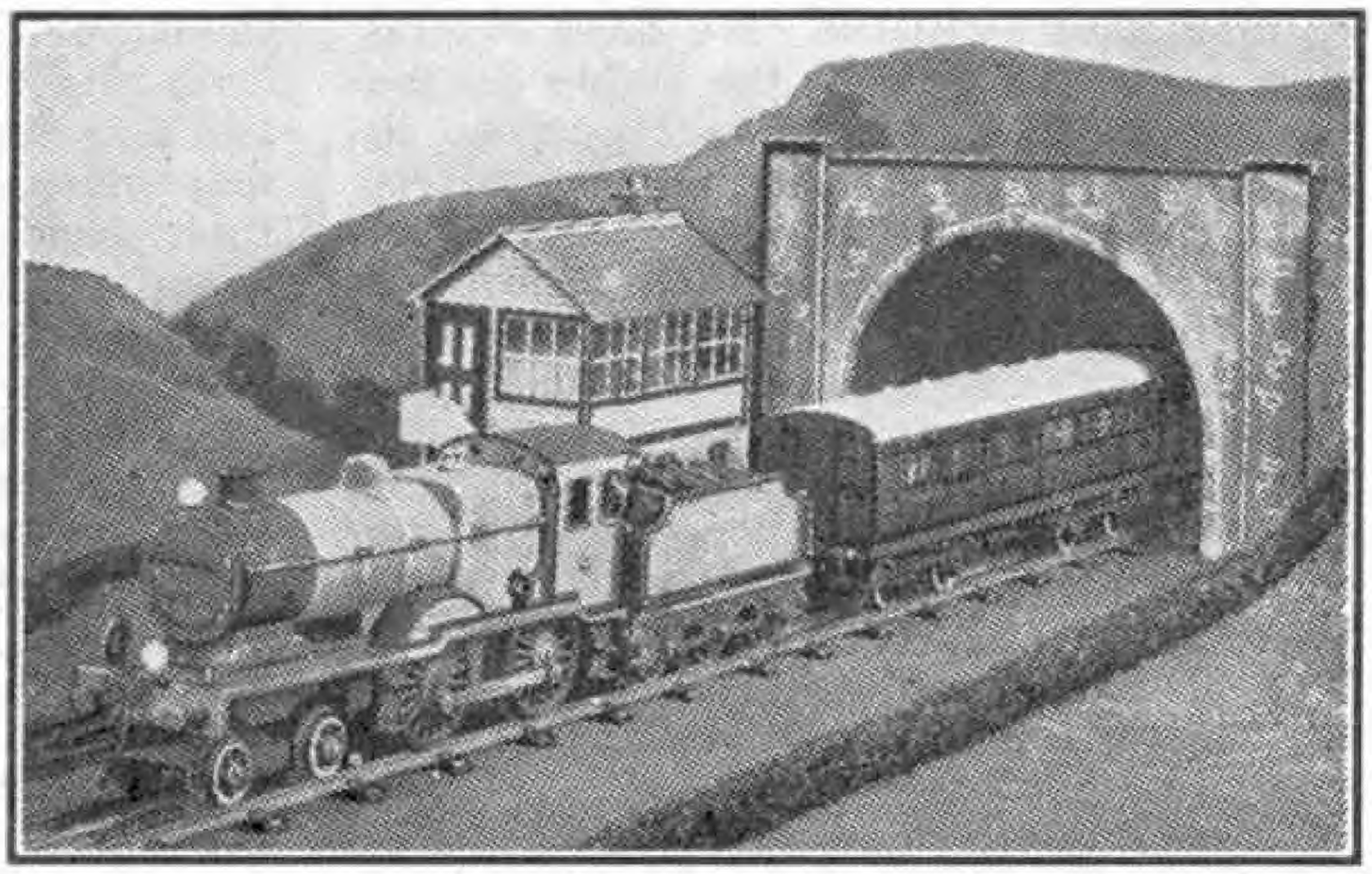
BURNLEY—This newly-incorporated Branch has carried out track operations on an outdoor layout. A good track is now being constructed, with branches and sidings, and the number of locomotives is to be increased. Discussion meetings are being arranged. *Secretary:* J. Barrett, 5, Brunel Street, Burnley, Lancs.

DURHAM SCHOOL—Scale model track has been laid down. This is being electrified, and remote control for points and signals installed in preparation for running operations. Scenery is now to be made. *Secretary:* P. G. I. Green, Poole House, Durham.

Some Hornby "Southern" Schemes

THOSE of our readers who favour the Southern Railway in their miniature railway operations will no doubt find some interest in the details given on this page of various S.R. schemes that can be worked out with Hornby railway material.

A feature of S.R. practice is the frequent interchange of locomotive between the various constituent Sections. Eastern, Central and Western. Thus although a particular class may have originated on one Section, individual engines may often be found on duty on the metals of another Section. This is of great convenience to the miniature railway owner for it widens his choice of the scheme that he can follow up. The accompanying photograph shows a Hornby No. 2 Special 4-4-0 of the "L1" Class on a train emerging from a tunnel. This is a model of an Eastern Section engine, but it is represented as being on Western Section duty. The route indication it displays at the front and by means of the characteristic white discs shows that it is a "West of England" train following the main line route via Salisbury. In this way any S.R. miniature railway owner who wants a change from the normal work performed by these engines can turn his attention from the Kent Coast services normally run by "L" and "L1" class locomotives to the longer-distance trains between Waterloo and the West Country.



A miniature S.R. express hauled by a Hornby No. 2 Special Locomotive No. 1759, which represents the real "L1" class.

As the Central Section now boasts so few trains of great consequence that are steam operated, we are concerned in this article principally with the Eastern and Western Sections. An engine in the Hornby Series that is equally at home on the main lines of either is the popular "Schools" class model "*Eton*." As a representative of the later Maunsell practice it is an ideal engine for a wide variety of duties.

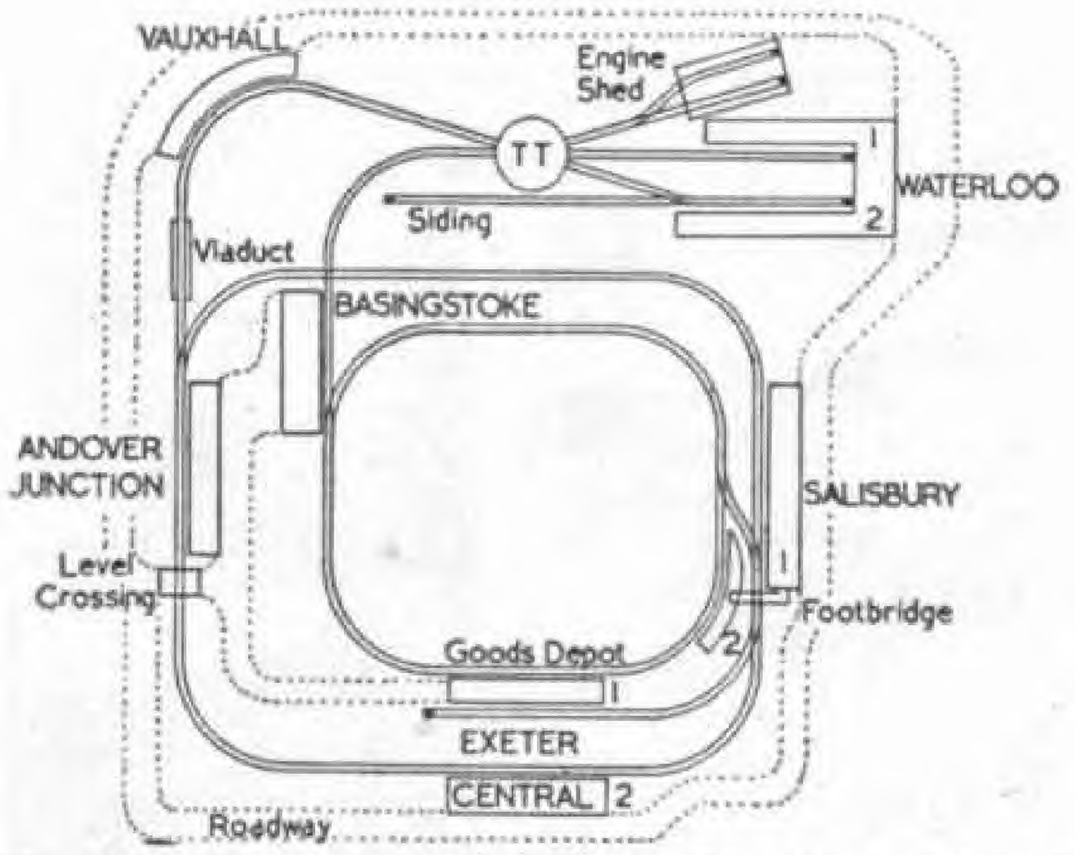
The model just referred to is provided with miniature white discs which make it possible to display any of the standard "engine head signals," as they are called on the S.R., according to the route that the train is to follow. Those who have other Hornby S.R. models can easily make white discs for them from thin white card, postcard or visiting card will do very well. The discs should be fitted at the back with a little strip of gummed paper formed into a loop to allow the discs to be attached to the lamp brackets that are fitted on all Hornby locomotives from the M3 type Tank upward. These little additions provide a great air of realism on any S.R. System, and are well worth the small amount of time and trouble involved.

The standard expresses of the S.R. are readily made up of Hornby No. 2 Corridor Coaches, and these when vestibuled together by means of the miniature Corridor Connection have a smart and business-like appearance. Those who still operate the Pullman luxury trains of peacetime can make good use of the various Hornby Pullman Coaches, either as complete trains or by including a Pullman in the make-up of an express composed otherwise of standard stock. Train name and destination boards, either of Hornby manufacture or made at home, to provide for names and destinations not included in the standard range, add a finishing touch to the trains.

In these days of the pooling of rolling stock the miniature railway owner with a variety of vehicles can readily assemble a train that will look "at home" on any line. Special attention is usually given in miniature to the running of trains carrying perishables, and plenty of examples can be observed in real practice, the operation of which can be reproduced in model form. Milk Vans, Meat Vans and so on can be kept fully occupied, and the supposed requirements of "military traffic" can be taken as the reason for the running of numerous "specials."

A Southern layout on which particular attention is paid to freight traffic is that shown in the diagram on this page. This is operated by our reader J. Blanchard, Blandford, who has managed to include a number of the principal stations on the Western Section of the S.R. between Waterloo and Exeter. The arrangement of "*Waterloo*" and its approaches is of interest, as ingenious use has been made of the turntable serving the engine shed to provide for the joining of the line from "*Vauxhall*" and that from "*Basingstoke*." By the use of the crossover connecting the inner and outer main ovals, good long runs can be had in either the "down" or "up" direction. The railway is not laid down permanently so that slight alterations in detail can be incorporated each time it is laid down afresh, but the usual formation is illustrated.

The locomotives used are all of Hornby manufacture.



The S.R. Layout of J. Blanchard, Blandford, referred to on this page.

More Fun in Dublo Operations

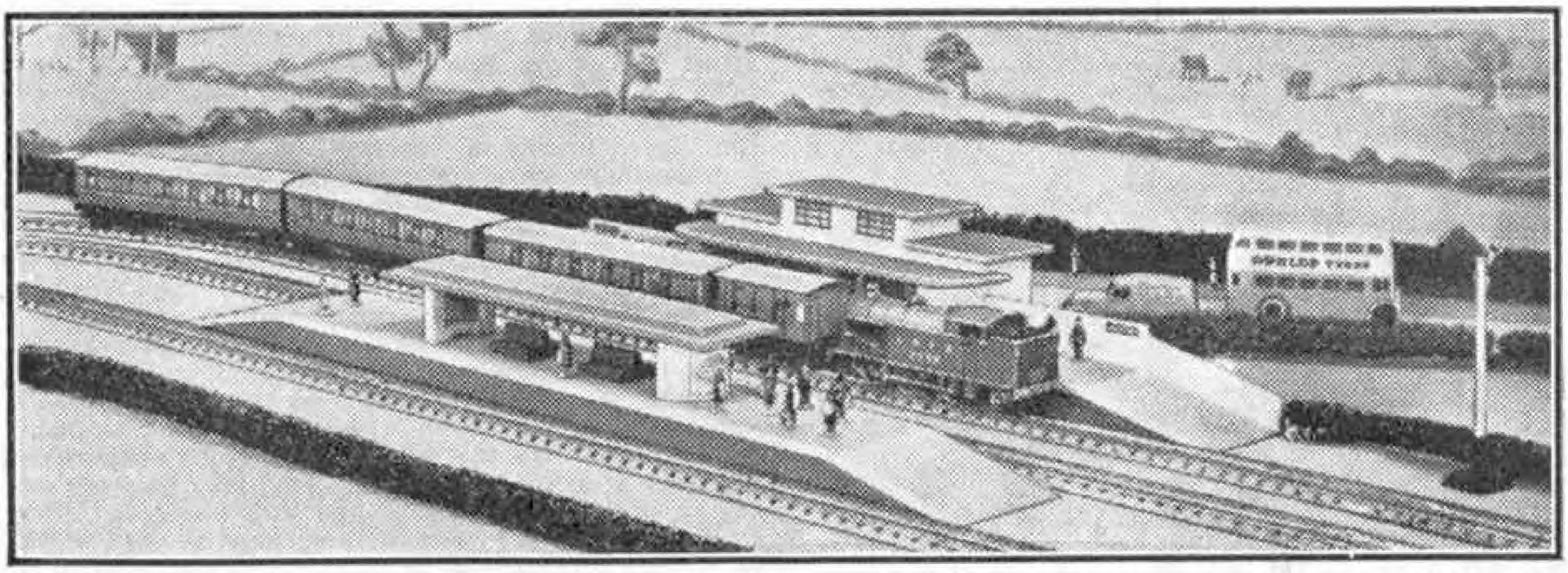
THIS month we deal with schemes in the general operation of a Hornby-Dublo layout that increase the interest and therefore the fun of working. Nowadays it is more than ever necessary to make the best possible use of whatever material we may have available. We have several times suggested uses for the Dublo Engine Shed apart from its original purpose in providing accommodation for locomotives when they are not in use. It makes quite an effective carriage shed, as no doubt many readers have found for themselves.

Another idea is to employ it to represent a more imposing goods shed or warehouse than the standard depot. Its all-over roof, and the fact that openings in the side and roof provide plenty of natural lighting inside, make it very suitable for the purpose. In dealing with long-distance freight traffic it is more realistic for the train to be assembled, and despatched from or worked to, an important-looking building rather than the ordinary wayside type of Goods Depot. The latter is excellent of course for normal circumstances, for it represents the average wayside goods shed; but the Engine Shed can be used very well at busy traffic centres to reproduce the average "town" depot. The lower illustration on the next page shows the Engine Shed in use as a big depot or "transhipping shed" where traffic is received, sorted and reloaded to destination. The train shown is composed of Vans only, most of them of the types used for foodstuffs or similar perishables; and a special air of importance is given to it by the use of the handsome streamliner *"Sir Nigel Gresley"* at the head of the train.

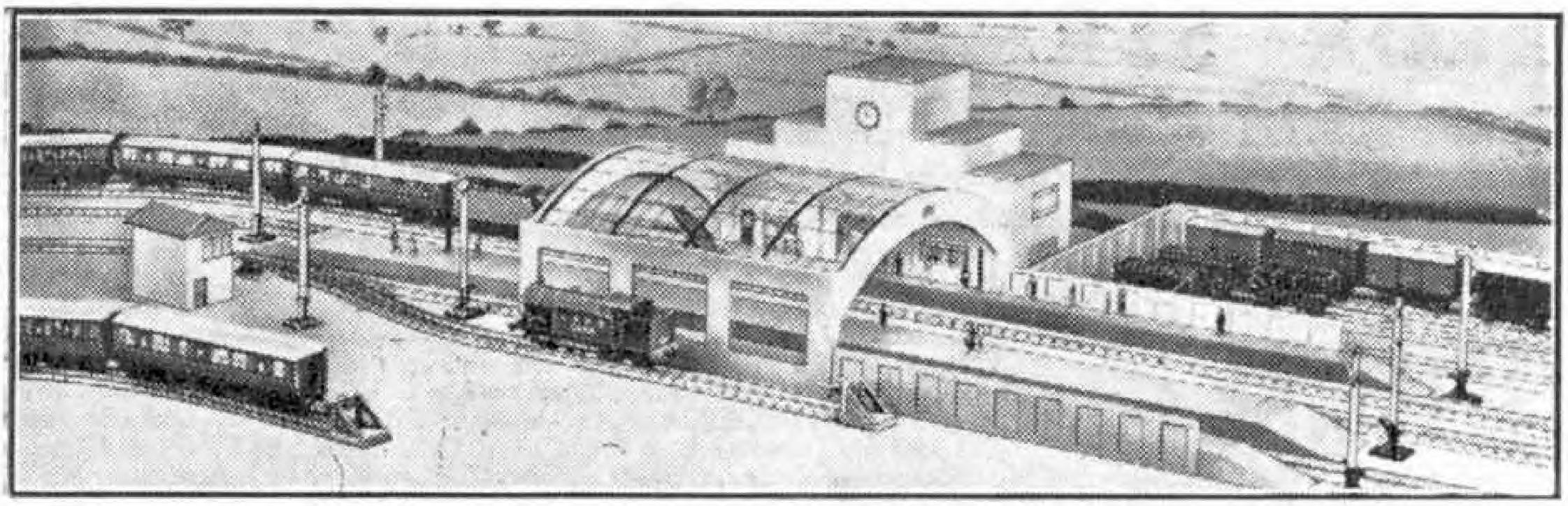
In miniature it is quite a good scheme to include a regular express freight in each spell of operation. This will be made up from batches of vehicles shunted into the "depot" as if they had been collected in the course of a "pick-up" trip by one of the handy Dublo Tank Locomotives. After arranging the Vans in the order required, and allowing a little time for the supposed rearrangement of their loads according to their destinations, the engine could then go off to further duties and be replaced for the long-distance run by the 4–6–2 express.

Similar operations in the reverse order could be carried on arrival, no doubt at the same depot in the case of most miniature railways; and to add still further to the variety, road motor vehicles could be brought up to the building to assist in "delivering the goods." Such working is typical of the daily or nightly round at big depots up and down the country and to carry them out in miniature will be found to provide a great deal of fun even on a "one-man" layout.

Most of us have seen at a terminus or a junction station an engine "waiting about," sometimes as if for no particular purpose. Then later a train arrives and our waiting engine becomes active. There may be through coaches to be detached and worked away to their destinations. On the other hand, the whole train, having discharged its passengers, will have to be worked out empty to the carriage depot or storage sidings. Whichever it is we are seized with the idea of reproducing the same working in miniature and find a great deal of entertainment



A Dublo local train at a station with a Horse Box next to the engine. Odd vans are often attached to the passenger trains in this way.



An express arriving at a big main line station. The 0-6-2 Tank in the siding is waiting to back on to the rear of the train and work it away "empty" to the sidings.

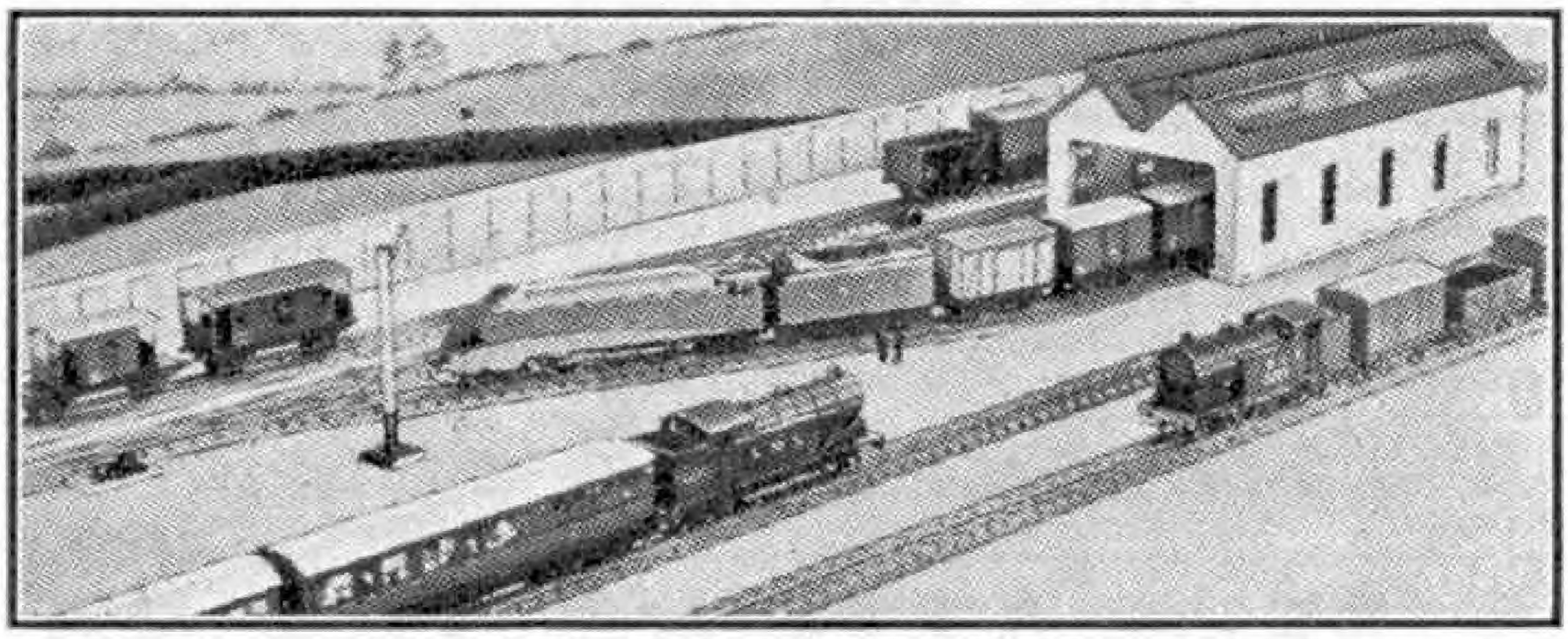
from including such operations in the general running of our station.

Actually Hornby-Dublo equipment is exactly suited to reproducing a "through coach" working of actual practice, especially if we are running a miniature L.N.E.R. system. We can work our main line express as a combined train from *"King's Cross"* for *"Leeds"* and *"Bradford"* in much the same way as the popular *"West Riding Limited"* of pre-war days. So our 4–6–2 Streamliner glides into the station with a load of perhaps a Two-Coach Articulated Unit and a single Corridor Coach, the latter representing the *"Bradford"* section of the train. The real Leeds Central is a terminal, so that vehicles for Bradford are worked out again, very often by 0–6–2 tanks to which the Dublo Standard Tank bears such a strong resemblance. Thus we back our waiting engine on to the rear of the train that has just arrived, part the couplings between the two portions of the train, and in a few moments give the *"right away"* for the miniature *"Bradford"* coach.

It must not be forgotten that on an electrically operated layout it is necessary for a track to be divided into sections, preferably by means of Dublo Isolating Rails, so that the Tank Locomotive can be moved into the same track as the other engine, the latter of course standing on a section that can be "cut out" electrically after the arrival of the train.

At other times the train can be worked out complete as "empty coaches" to the sidings to be prepared for another main line run. Yet another scheme is to use it complete to make a suburban journey in between spells of main line duty. Our waiting engine then takes the part of a "turnover" locomotive of real life, and the use of main line stock in the manner suggested is also quite frequent in real practice.

Further interesting station and train working is made possible if traffic requirements necessitate the addition of an odd Van or two to a passenger train. Possibly a Horse Box is wanted further down the line, and the best way to get it there is by attaching it to the next passenger train. Or perhaps a local station has a regular through small consignment of perishables to be forwarded, and the Van for this traffic is attached to a definite train each day. There is the greatest variety of this kind of work in real practice, and the operation of a miniature system is made all the more railway-like by the inclusion of similar schemes.



A busy scene on a Dublo layout with the Engine Shed used as a depot or warehouse. The 4-6-2 Streamlined Locomotive is leaving with a perishable train.

Siding arrangements have to be considered when setting the position of the Horse Box, or Van, in the train, and the operator should work out the required movements beforehand.

Other Stamp Advertisements on page 68 and v.

Stamp Collecting

Stamps of the Free Countries. No. 1 Norway

By F. E. Metcalfe

FEW sets of stamps will receive a warmer welcome from British and American collectors than the one recently issued in London by the Free Norwegian Government. None of our Allies has greater claim to the proof that such an issue affords of the right to be still considered a sovereign state, in spite of temporary occupation of their territory by Nazi gangsters.

Norway is a small country of under three million inhabitants, yet at the beginning of the war its mercantile marine was the fourth largest in the world, and second to none in efficiency. Even now 25,000 Norwegians are serving afloat, in their country's merchant service or our own, and Norway is also operating 60 naval vessels and has its own army and air force. Norwegian women too have their own military organizations, and all are trained and ready for the great day of liberation. The stamps will be used principally by Norwegian seamen and, in certain circumstances, by men and women in Norwegian military camps in Great Britain and Canada.

The new set is not so large nor quite as elaborate as the Free Polish set. It is typical of previous Norwegian issues, in spite of the fact that it was designed and printed in London. It must be admitted that apart from half a dozen or so commemoratives the earlier Norse stamps are almost as dull as our own, or so they must appear to collectors of modern pictorials; nevertheless they have enjoyed a fairly widespread popularity, for unlike most other European postal administrations, the Norwegian authorities have never angled for collectors' pence.

The issues from 1855 to 1857 have been particular favourites with older collectors. Although the second issue, 1856-7, contains no stamps that are really scarce, very few fine copies are to be found in dealers' stockbooks, but this is due to a great extent to "holding" rather than to rarity; we know of one collector alone who has several thousand beautiful copies.

As readers will see from our illustrations, the new Free Norway set comprises six stamps, with a total face value of 2/–, and as is to be expected from such a race of seafarers, there is a distinctly maritime flavour about most of the set. The lowest value is the green 10 ore. It shows the famous Norwegian destroyer "*Sleipner*," the phantom ship as it was sometimes called, which played a gallant part in the battle of Norway before it came over to Britain. The vessel has well earned its place in the set.

The next value is the olive green 15 ore, with its picture of a Norwegian airman standing in front of a fighter aeroplane. Then we get the red 20 ore, depicting the home front, with the slogan "*Vi Vil Vinne*," painted across the road. This of course means "*We will win.*"

The fourth value is the 30 ore printed in ultramarine, the picture on which is that of a Norwegian ship in convoy. The 40 ore is another green stamp, showing Norwegian soldiers on Winter manœuvres, and finally we have the blue 60 ore stamp with a portrait of the grave and gallant King Haakon VII, husband of the late British-born Queen Maud.

Altogether the issue makes a fine little set that is well worthy of a place in every collector's album. At this time of the year many collectors are wondering what to collect. Some are new to the hobby and have turned to it as a recreation for the long winter nights; some have been given a new blank album; others just want a change. All these might well consider forming a collection of the group of which this Norwegian set is part –that is the stamps of the Free Countries, which include the French Colonies that have rallied to the flag of General de Gaulle, as well as Free Poland.

The Free French colonies that have issued at least one set are the Cameroons, French Equatorial Africa, Indian Settlements, New Hebrides, New Caledonia and St. Pierre and Miquelon. Recent sets from Lebanon, Levant and Syria can also be considered in this group, but not those of Wallis and Futuna, a dependency of New Caledonia in which overprinted stamps of the latter are used. Readers had better leave the Wallis and Futuna set alone for the time being. Stamps of New Caledonia were overprinted in readiness for issue there, but never appeared; no doubt the Free French authorities are living in hope of issuing them, for they hold stocks in London. Some apparently leaked out, via Australia it is said, and they are offered occasionally at the price of several pounds! This is absurd, for if the (*Continued on page 69*)

Other Stamp Advertisements on pages 66 and v.

Stamp Gossip

and Notes on New Issues

The New British Colonials

General collectors who prefer modern issues are having a lean time these days as far as foreign stamps are concerned, for most of those appearing are unobtainable; but collectors of modern British Colonials have little to grumble about. They are being well catered for, and just now stamps from Bahamas and South Africa call for particular comment.

The first notice, late last year, that Bahamas was to overprint its entire set to commemorate the "*Landfall of Columbus*," caused a stir. All the facts of the issue pointed to a last-minute decision, with nothing to show that the Post Office was in any way to blame for this; and as the demand was tremendous, dealers could hardly expect their orders to be filled at once. After all, if postal services were to continue, the Post Office at Nassau would need a few stamps for its own use! The usual rumours started their flight and the overprinted set was said to have been sold out in two days. As the Post Office continued to sell stamps and actually never ceased to fill dealers' orders, sanity returned, and no doubt by now most readers will have obtained their sets.

Apparently dealers are getting full supplies, and Reuters cabled in December that sales to date amounted to £40,000, so there should be ample to go round. As the stamps go off sale on 12th April, collectors who have yet to buy should waste no more time than is necessary.

The overprinting was done in Bahamas, and a first-class job it is, with the "varieties" hardly worth mentioning. Regarding the stamps themselves, the 3d. value is the new blue, a colour change that was foreshadowed months ago. The 2½d. blue is also due for a change in colour, to violet, and it is possible that the old stamp, which has actually received the overprint, may not last out the whole of the six months, so that we may get the 2½d. value in two colours.

We may see a slight change also in the 1/- value. There was a reprinting late last year and the paper used was that of the 5/- and £1 stamps, which is thicker than that used previously. The stamp used for overprinting was that in use before the new printing, however, and consequently is on the thinner paper. It will be realised that this may not hold out either.

South African Bantams

Now we come to the stamps of South Africa and South-West Africa. As the original defence sets have been out some time, most interested collectors will already have secured theirs, but those who bought early should not overlook later printings, for several differ a great deal in shades. The most notable of all in this respect is the ½d. value, for both bright green and blue green are now catalogued for South Africa; and later this will have to be done with South-West Africa, for both shades exist also for this latter country. Later printings of the 3d. and 4d. values also differ considerably, though hardly enough to warrant places in the catalogue, but they are none the less interesting for that.

It is the new "bantams" of South Africa that have aroused the most interest however. We know of a dealer who got a real shock the other day, when asked for a "bantam" stamp of South Australia; it has been left for the collector of 1943 to name aptly the tiny stamps issued there in 1882, over 60 years ago.

It is a long time since such interesting stamps as these from South Africa were issued, with their attractive colours and roulette-cum-perforations. Not all the values have yet appeared, and we have it from the postal authorities at Windhoek, South-West Africa, that as far as they are concerned the last value will not be issued until November next. But collectors will be well advised to get the stamps as they are offered, for there may be perforation changes in the 1½d. and 6d. values.

Interesting Colour Changes

The four new colours of Nyasaland values, ½d. to 2d., are out, and they too may have a short life, as an entirely new set for this colony is announced, but it will not appear just yet.

After many months the new 1½d. lilac of Gibraltar has been issued, and the new 2d. red of Barbados have been despatched, according to the Crown Agents.

Stamp Collecting—(*Continued from page 67*)

stamps are never issued they will not get catalogue status, and if they are they will be on sale for a few shillings a set.

This Wallis and Futuna set is the only one of the group against which readers need be warned. All the rest are well worth collecting. Some of the values of the overprinted sets of Cameróons and St. Pierre and Miquelon are beyond the pocket of the average collector, even if they can be found. The recent changes in other French Colonies such as Senegal and Niger may result in further Free French issues, however, and collectors who start this Free Nation group now will get in on the ground floor on anything new.

Our Airborne Troops—(*Continued from page 40*)

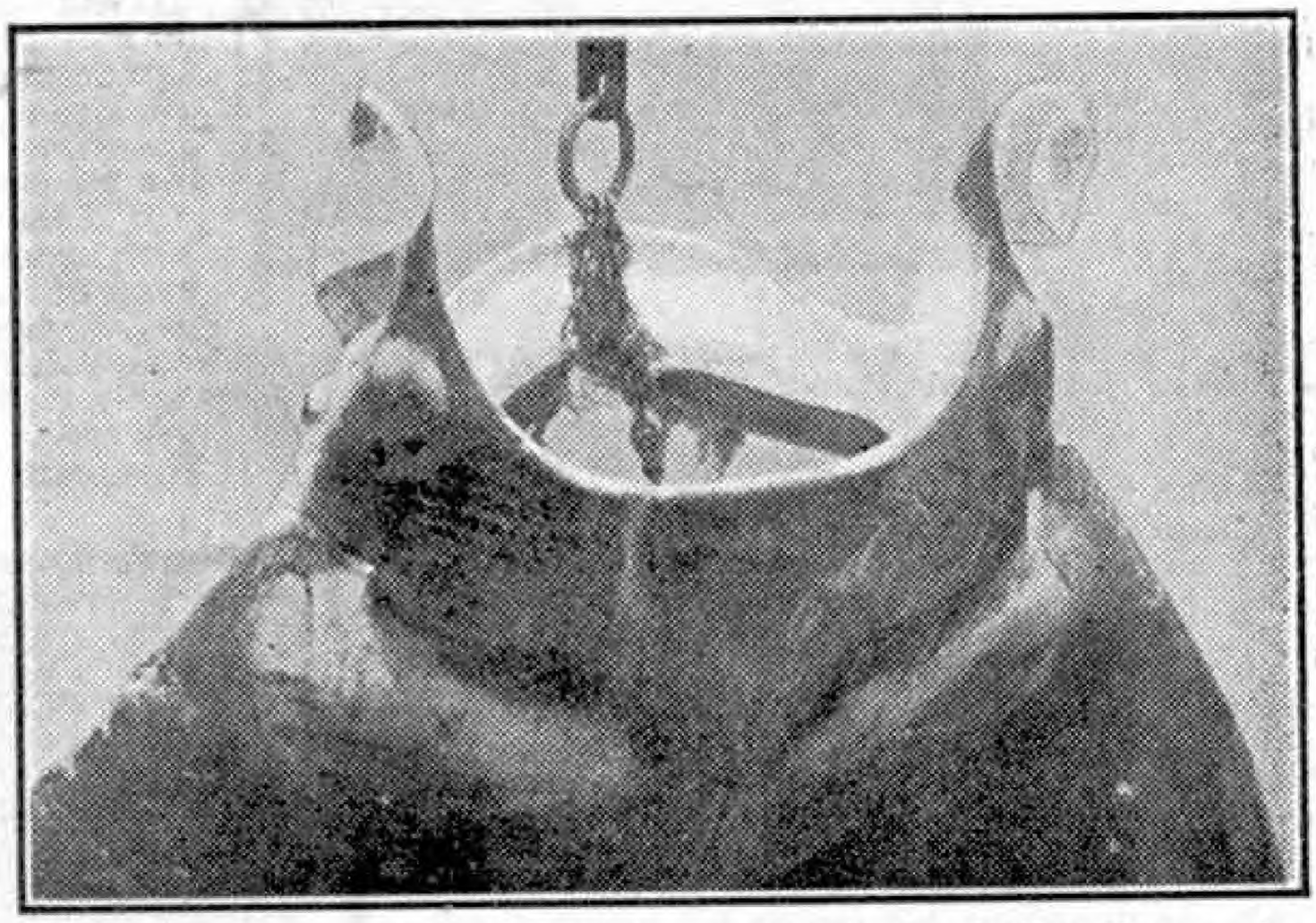
me tell you that, in spite of all you have read and seen on the movies and in pictures about American airborne troops, our people are not at all behind them. There is too much modesty about us, and we are too fond of letting our people think that our gallant Allies are always a few jumps in front of us. For instance, you may have heard of the "Bazooka" —just wait and see what our infantry have got. Probably the Home Guard know all about it already.

An Airborne Division– of which we ought to have dozens—consists of parachute brigades, air-landing (glider) brigades, glider-pilots. Head Quarters Staff, administration, supply, repair, signals and medical branches, all under Army Air Corps Command. There is also an Airborne Forces Experimental Establishment, where new weapons are constantly produced or invented or developed.

GUIDANCE IN HOME STUDY

Wolsey Hall, the well-known correspondence college in Oxford, prepares students for a wide range of examinations, including those required for degrees. The method of work followed is very interesting. The student receives a week's work at a time, with instructions in the method of studying, notes making difficult points clear, a test paper and model answers on which he can base his own replies to questions. He is encouraged to inform his tutors of any special difficulties, enquiry forms being provided for this purpose, so that he receives individual attention and help, and the value of the courses followed is shown by the fact that Wolsey Hall guarantees to continue tuition without further fee for a student who has failed in any examination. Other advantages include a lending library, and special arrangements for purchasing the necessary text books by instalments

With these excellent methods and a strong staff of tutors it is not surprising to read of extremely successful results, and perhaps the best recommendation is the fact that more than half the students of Wolsey Hall enrol either through having taken a course before or as a result of the satisfactory experience of friends. Readers who are interested should write to the Director of Studies, Dept. G.K.1, Wolsey Hall, Oxford, for advice and information, mentioning the "*M.M.*" when doing so.



The cavernous mouth of a giant ray caught in the Indian Ocean. An illustration of the ray itself appears on page 51. Our photograph is reproduced by courtesy of A. B. Williams, Birkenhead.

JOHNSON'S No. 1 PHOTOGRAPHIC CONTEST

The chief prize-winners in Johnson's No 1 Photographic Contest, which closed on 30th November 1942, were as follows: First Prizes, £5 each: A. H. Hamilton, Motherwell; M Popplewell, Scarborough. Second Prizes: £2 each: L. W. Sharp, Ponders End; C. F. F. Snow, Windsor; J. E. Lugton, Crosby. Other prizes including 10 of £1 each, 24 of 10/- each, and 25 consolation awards.

COMPETITION RESULTS

HOME

October Signalling Contest.—1. R. G. Lucas, New Barnet. 2. F. D. Johnston, London S.E.17. 3. R. N. Cochrane, Chester-le-Street Consolation Prizes: W. Miller, Llandudno; C. R. Stannard, Barham; N. Lord, Manchester

November Wagons Contest.—1. H. Steggles, Cardiff. 2. R. H. Hughes, Altrincham. 3. F. Mills, Kearsley. Consolation Prizes: A. G. Doxford, Wallsend; H. N. Hodgkinson, Bulwell; K. Kettell, Rotherham.

November New Words Contest.—1. R. L. Pellatt, Manchester 21. 2. E. G. Smith, Manchester 21. 3. A. J. McCombe, Enfield. Consolation Prizes: C. E. Wrayford, Bovey Tracey; R. B. Chalmers, Berkhamsted; D. Prest, Rutland.

November Photographic Contest.—1st Prizes, Section A: A. Bennett, St. Neots; Section B: D. Carron, Portrush. Second Prizes, Section A: W. Wyatt, Liverpool 19; Section B: P. Parkinson, New Malden. Consolation Prizes: R. Atkins, Eccles; J. N. Busbridge, Ford; C. A. Reader, Guildford; F. Barrage, Hornchurch.

December Photographic Contest.—1st Prizes, Section A: J. Herbert Gittens, Weybridge, Surrey; Section B: J. B. Alker, Standish, Nr. Wigan. Second Prizes, Section A: T. Bird, Stopsley, Luton; Section B: D. Clarke, Belfast. Consolation Prizes: F. Barr, Birkenhead; A. Bennett, St. Neots; G. W. Billam, Belvedere, Kent; P.C. Fletcher, Leicester.

OVERSEAS

May Missing Words Contest.—1. N. Macdougall, Abbotsfield, British Columbia. 2. M. Laubscher, Johannesburg. 3. N. Chalmers, Toronto. Consolation Prizes: J. Nel, Capetown; D. M. Watts, Winnipeg; P. Adshead, St. Catharine's, Ontario

June Names Puzzle: 1. J. Nel, Capetown. 2. H. H. Milligan, Capetown. 3. J. Hugh, Sydney. Consolation Prizes: R. Morton, Capetown; A. McNeil, Johannesburg; M. James, Edmonton.

June Photographic Contest.—1st Prizes, Section A: N. Corness, Edmonton; Section B: K. Norman, Johannesburg. Second Prizes, Section A: L. Jameson, Moncton; Section B: G. McNorton, Capetown. Consolation Prizes: J. Bowry, Sydney; A. Brounton, Edmonton; E. Jakes, Quebec; D. Daleston, Canberra.

June Train Parts Contest.—1. H. H. Williams, Capetown. 2. F. J. Harrison, Bulawayo. 3. R. G. Blackadar, Ottawa. Consolation Prizes: J. R. Mossop, Victoria; K. Simpson, Johannesburg; G. Myburgh, Claremont.

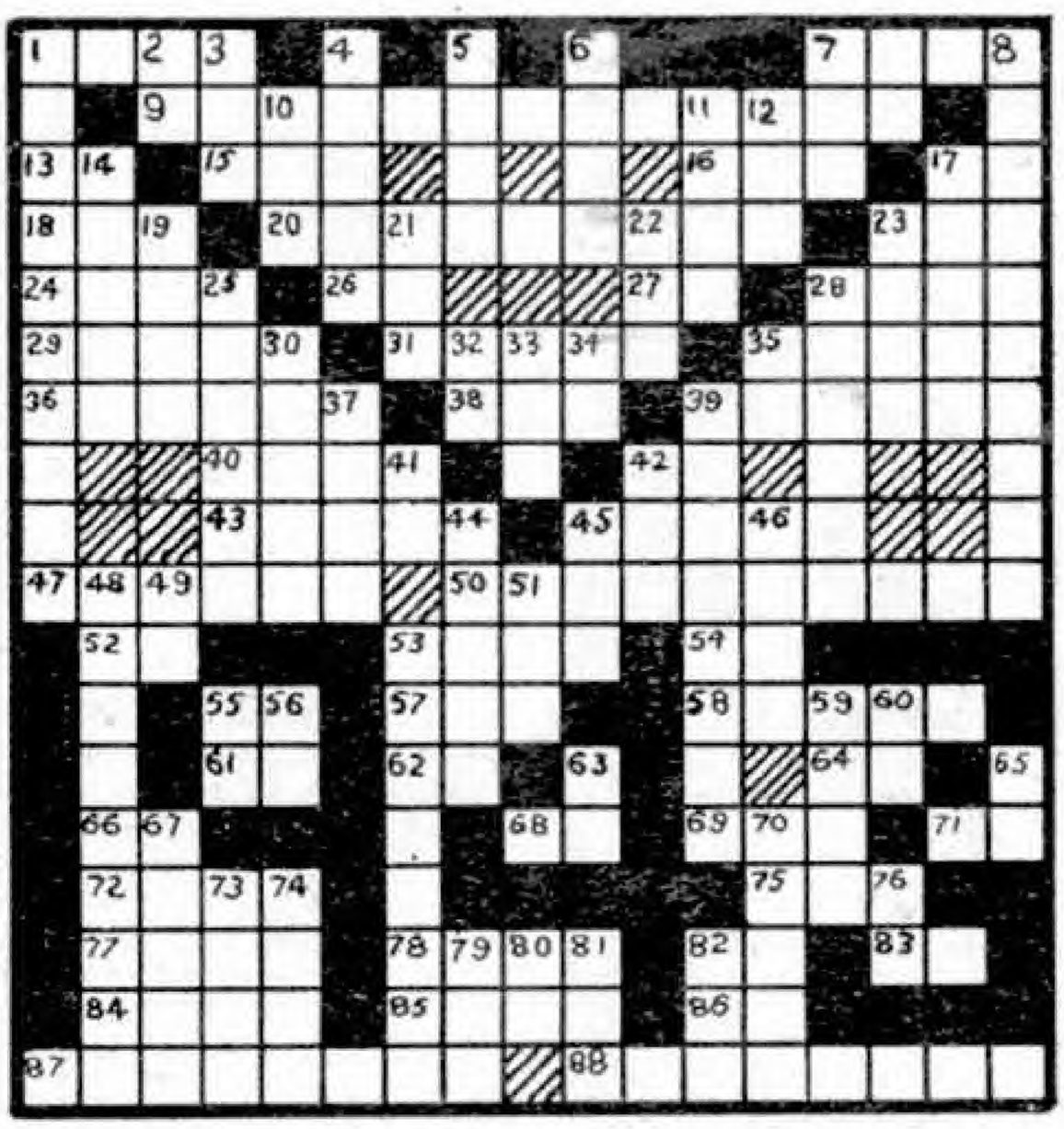
July Railway Quiz Contest.—1. I. M. Andrews, Capetown. 2. T. Roberts, Sydney. 3. S. Parry, Auckland. Consolation Prizes: A. Fairham, Capetown; W. Nelson, Johannesburg.

July Photographic Contest.—1st Prizes, Section A: N. Corness, Edmonton; Section B: I. M. Andrews, Capetown. Second Prizes, Section A: K. Barker, Capetown. Section B: S. Williams, Johannesburg.

Competitions! Open To All Readers

Victory Crossword Puzzle

CLUES ACROSS: 1 Cord. 7 Highest point. 9 Profanely. 13 Depart. 15 Skin of young animal. 16 Head. 17 Exist. 18 Beheaded Seeds. 20 Madman. 23 A famous clock. 24 Slang sleuths. 26 Not any. 27 Behold. 28 Cease to have. 29 Angry. 31 A time. 35 Staff. 36 Malevolent. 38 Girl's name. 39 A right. 40 Friend. 42 King George (initials). 43 A day of Brahma. 45 Proof of absence. 47 Mix it to get smiles. 50 Engraving on wax. 52 Motor car race. 53 Learning. 54 General Assembly (initials). 55 Article. 57 Trouble. 58 Unintelligent. 61 A child's thanks. 62 Noun without a middle. 64 Proceed. 66 Beheaded foe. 68 Pronoun. 69 Gardening tool. 71 Indefinite article. 72 Wasted. 75 To say further. 77 Interjection. 78 Other. 82 Conjunction. 83 Forward. 84 Docile. 85 Nigh. 86 Only part of a gill. 87 Consecrate. 88 Gospel Preachers.



CLUES DOWN: 1 Lawful. 2 Note well (initials). 3 Species of deer. 4 Trembling poplar. 5 Large vessel. 6 Arab chieftain. 7 Priest's vestment. 8 Primary. 10 Help. 11 Ruin. 12 Curtail soot. 14 Musical drama. 17 Wild ox. 19 Measure must be shortened. 21 Pig. 22 Drink. 23 Carry. 25 Rods. 28 Baltic country. 30 Small Surrey town. 32 Pronoun. 33 Evergreen. 34 Exclamation. 35 Degree. 37 Void. 39 Affected. 41 Member of Parliament (initials). 42 Brightness reduced. 44 Fruit. 45 Square measure. 46 Inner husk of corn. 48 Contract. 49 Same as 68 across. 51 R.A.F. term (slang). 53 Embrocation. 55 Preposition. 56 North America (initials). 59 Old. 60 Negative. 63 Denoting presence. 65 Within. 67 Wanderer. 70 Fertile spot. 73 Half. 74 American coin reversed. 76 Act. 79 Shelter. 80 South Africa (initials). 81 An epoch. 82 Past.

We all hope that 1943 will be a good year of victory, even if it does not bring with it the end of the war. Readers therefore will welcome the ingenious Victory Crossword Puzzle we are giving them this month. It is the work of a reader, B. J. Longhurst, and there are no difficult or unduly puzzling clues in it. Every word can be found in standard dictionaries.

As usual, there are two sections in the competition, for Home and Overseas readers respectively, and in each prizes of 21/–, 10/6 and 5/– will be awarded for the best solutions. If necessary judges will take neatness and novelty into consideration.

Entries should be addressed *"Victory Crossword Puzzle, Meccano Magazine, Binns Road, Liverpool 13."* The closing date in the Home Section is 1st March; that in the Overseas Section is 30th June.

A Railway "Quiz"

Our contest this month is quite easy, but attractive. It takes the form of a "quiz" in which entrants are required to give the names of railway features, such as locomotives, track and parts of engines or railway equipment, or even staff. The letters contained in the answers to the questions are indicated by crosses and dashes, the crosses representing vowels and the dashes consonants.

1. A wheel arrangement: – x – x – x
2. Part of the permanent way: – x – – x – –
3. Fitted to a great many locomotives: – x – x – – x x – x – –
4. Situated between the rails: – x – x – – – x x – – –
5. A ground signal: – x – – – – x – –
6. Feature of American locomotives: – x – – x – – – x –
7. Famous Tunnel: – – x – – x – – x
8. Pioneer Locomotive: – x – – x –
9. Entrance to cylinder: – x – –
10. Controls the locomotive: – – x – x –
11. Part of cab: – x x – – – x – x
12. Often audible: x – – x x – –
13. These form a junction: – x x – – –
14. A G.W.R. van: – x – – x –
15. Part of valve motion: – x – x x – – x –
16. A streamlined Locomotive: – x – – x – – x –

As usual the contest is divided into two sections, for Home and Overseas readers respectively. In each section there will be prizes of 21/–, 10/6 and 5/–, together with consolation prizes, for the best solutions in order of merit. Novelty and neatness will be taken into consideration.

Entries should be addressed *"February Railway Quiz Contest, Meccano Magazine, Binns Road, Liverpool 13."* The closing dates are: Home Section, 1st March; Overseas Section, 30th June.

February Photographic Contest

This month's photographic contest is the 2nd of our 1943 series, and in it, as usual, prizes are offered for the best photographs of any kind submitted. There are two conditions—1, that the photograph must have been taken by the competitor, and 2, that on the back of each print must be stated exactly what the photograph represents. A fancy title may be added if desired.

Entries will be divided into two sections, A for readers aged 16 and over, and B for those under 16. They should be addressed *"February Photo. Contest, Meccano Magazine, Binns Road, Liverpool 13."* There will be separate sections for Overseas readers.

In each section prizes of 15/– and 7/6 will be awarded, together with consolation prizes for good efforts. Closing dates: Home Section, 1st March; Overseas Section, 30th June, 1943.

Fireside Fun

Magistrate: "Could the motorist have avoided hitting you?"
Plaintiff: "Yes, sir. He had the choice of hitting me or my wife, and he picked on me."

* * * *

Johnny: "Is it really lucky to be followed by a black cat?"
Father: "It depends whether you are a man or a mouse."

* * * *

"What kind of a dog is that?"
"That's a police dog."
"It doesn't look like a police dog."
"Of course not. It's in the secret service."

* * * *

Irate Bus Driver, held up in narrow road: "Hey, what's up down there?"
Yokel: "Darned old horse be down, that's what's up."

* * * *

"What are you hacking at your steak like that for, Bill? Is it tough?"
"Tough? Say, Tom, it isn't the food that does you good in this joint, it's the exercise."

* * * *

Guest: "Have you been long in the service of the family, Jenkins?"
Butler: "Yes, sir. I am now serving the third degeneration."

* * * *

"Mother, may I keep a diary?"
"Of course."
"And may I do the things to write in it?"

* * * *

Teacher: "And what can we do with the whale?"
Smart Boy: "Eat it, miss."
Teacher (sarcastically): "Oh. What would you do with the bones?"
Smart Boy: "Put them on the edge of the plate."

* * * *

Smith: "I shall have to get rid of that chauffeur of mine. He's nearly killed me several times."
Mrs. Smith: "Oh, give him another chance."

* * * *

Little Man: "Let me get on the bus. I don't take up much room."
Conductress: "Sorry, full up."
Little Man: "But I'm part of the national effort."
Conductress: "It wouldn't make any difference if you were part of the National Anthem."

* * * *

"Was your vegetable garden a success this year?"
"Oh, yes. We had it for lunch last Sunday."

* * * *

THIS MONTH'S HOWLER

A spa is a place where you drink bath water.

BRAIN TEASERS

Here is an easy but interesting puzzle to start with. Can you read the following to make sense?:

Y Y U R
Y Y U B
I C U R
Y Y for me.

* * * *

CRAZY DIVISION

Now comes another effort that seems to be in code. It is really a division sum, and the puzzle is to find what numbers are represented by the letters. It isn't really difficult. Try it!

```
STLO)LLTVNJNO(LVJO
     STLO
     ----
     VJLVJ
     LSHUJ
     -----
      RSJNO
      RSJNO
      -----
      JJJJJ
```

* * * *

WHAT AEROPLANES ARE THESE?

This will prove easier. In each of the following jumbles the name of a well-known aeroplane is hidden? What are the names?

CRAANLEST
EROTSFRS
GUNTSAM
NIRGLITS
HETSANCRME
TREBORIAL (T.K.C.)

* * * *

"I'll say they're high-powered! With those glasses anything less than 10 miles away appears to be behind you."

* * * *

BRAIN TEASER SOLUTIONS

The first solution to be given this month is that of the fourth puzzle in the December 1942 "*M.M.*" The simple code followed in this was the reversed alphabet one, Z representing A, Y representing B, X representing C and so on, down to A representing Z. The result is an easy problem in age finding, the answer to which is 54 and 45 years.

Few readers would have any difficulty in working out how far Bill Smith travelled by various methods. He travelled 120 miles by motor car, 288 by water, and 360 by "road," which, truth to tell, should have read "rail."

"Spotting the Stars" is an interesting little teaser. The first figure in the shillings column in the dividend is easily seen to be 1 and the first in the pounds total then must be 2. A little trial with remaining figures soon shows that the sum divided by 3 must be £24/16/9 and the quotient £8/5/7.

In our last puzzle in the January "*M.M.*" the first bandit to know of the danger was the one who saw the smoke, for light travels faster than sound or bullet.

LIST OF "SCALELINE" PLANS

These Plans are believed to be the best available. They have been specially drawn for the simple construction of accurate models with materials usually found around the home. In addition to the usual plan and elevation drawings a plan of each piece of material required is given with the parts to be cut marked thereon. Constructional detail illustrations are given where necessary. Every part is listed in a Parts List for easy identification and all material sizes are shown. Comprehensive building instructions are included, together with technical data and historical notes.

AIRCRAFT—1/72nd scale.

Spitfire	6d.	Beaufighter	8d.
Hurricane, Mk. II	6d.	Whirlwind	8d.
Defiant	6d.	Mosquito	8d.
Tomahawk	6d.	Boston	8d.
Lysander	6d.	Halifax	1/-
Airacobra	6d.	Sunderland	1/-
Thunderbolt	6d.	Stirling	1/-
Hotspur Glider	6d.	Wellington	9d.
Mustang	6d.	Miles Master	6d.

Flying Fortress, Mk. I and 2 .. 1/-

Naval ships are usually built in classes. One of our plans will usually therefore cover a number of ships. For any ship listed in the first column below, order the plan listed against it in the second column.

BRITISH NAVY—Scale 50 ft. to 1 in.

	Order Plan	Price
Battleships H.M.S. King George V, Prince of Wales, Duke of York, Anson, Howe	H.M.S. King George V	1/-
H.M.S. Nelson, Rodney	H.M.S. Nelson	1/-
H.M.S. Queen Elizabeth, Warspite, Valiant, Malaya	H.M.S. Warspite	9d.
Battlecruiser H.M.S. Hood	H.M.S. Hood	1/-
AC/Carriers H.M.S. Ark Royal	H.M.S. Ark Royal	1/-
H.M.S. Illustrious, Victorious, Formidable, Indomitable	H.M.S. Illustrious	1/-
Cruisers H.M.S. Berwick, Cornwall, Kent, Cumberland, Suffolk	H.M.S. Cornwall	9d.
H.M.S. York, Exeter	H.M.S. Exeter	9d.
H.M.S. Achilles, Ajax, Leander, Neptune, Orion	H.M.S. Ajax	9d.
H.M.A.S. Perth, Hobart, Sydney	H.M.A.S. Sydney	9d.
H.M.S. London, Devonshire, Shropshire, Sussex	H.M.S. London	9d.
A.A. Cruisers H.M.S. Coventry Curlew, Ceres, Cardiff	H.M.S. Coventry	6d.
Tribal class Destroyers	H.M.S. Cossack	6d.
Javelin class Destroyers	H.M.S. Javelin	6d.
50 U.S.A. Destroyers	H.M.S. Churchill	6d.
Submarines		
H.M.S. Thames, Severn, Clyde	H.M.S. Thames	6d.
Armed Merchant Cruisers		
H.M.S. Alcantara, Asturias	H.M.S. Alcantara	1/-
Tank Carriers and Invasion Barges		6d.
Merchant Vessels		
Large Freighter 6d.	Oil Tanker	6d.
Small Freighter 6d.	Troopship	6d.

UNITED STATES NAVY

Battleships U.S.S. North Carolina, Washington, Indiana, Alabama, Massachusetts and South Dakota	U.S.S. Indiana	1/-
Cruisers U.S.S. Minneapolis, New Orleans, San Francisco, Tuscaloosa, Quincy, Vincennes and Satoria	U.S.S. New Orleans	9d.
Destroyers		
U.S.S. Somers, Warrington, Davis, Sampson and Jouett	U.S.S. Warrington	6d.
Submarines		
U.S.S. Narwhal and Nautilus	U.S.S. Nautilus	6d.

Frequent additions are made to both ranges.
From Stationers and Model Shops or direct from
MODELCRAFT LTD., 77, Grosvenor Rd., London S.W.1

This Month's Special Articles

MECCANO MAGAZINE

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Readers' Sales and Wants. Private advertisements (i.e., not trade) are charged 1d. per word, minimum 1/–. Cash with order. Editorial and Advertising matters should not be dealt with on the same sheet of paper.

Readers' advertisements are published as soon as possible; inclusion in the first issue after receiving them cannot be guaranteed.

Small Advertisements. 1/8 per line (average seven words to the line), or 20/– per inch (average 12 lines to the inch). Cash with order.

Display. Quotations for space bookings, and latest net sale figures, will be sent on request.

READERS' SALES AND WANTS

SALES

Good condition Meccano, mainly Blue-Gold; some Red-Green-Nickel; present cost new £6; lot 50/–, or will sell separately.—Elms, 14, Manorville Road, Hemel Hempstead, Herts.

"Hotspurs," August 1940 to date. Offers.—Clarke, 60, Elm Road, Stockport.

Bassett-Lowke Royal Scot, perfect, take £2/15/–; 3½ ft. Round Solid Steel Track, £2; one pair left hand Points for same, 15/–; two hand made electrically fitted Coaches, £1 each; No. 2 Hornby Station, 12/6; hand made Rolling Stock, 7/6. Best offer. No money till offer accepted.—Thomson, Southpark Avenue, Girvan, Ayrshire.

Powerful pair Binoculars for sale; wide range and field of vision; perfect condition; only 60/–; real bargain.—M. Hilleard, 14, Barnett Close, Leatherhead.

Hornby Clockwork Rails, Points, Rolling Stock and signals; gauge "0." Particulars to—Roberts, Vale Mount, Llangollen, Denbighshire.

Mersey Model Steam Engine 53 (stationary). What offers?—Marshall, Garth Road, Mansfield.

Quantity of gauge "0," 2 ft. radius, Clockwork Hornby, including Two Tank Engines, £4/10/–; stamp for list. Also "M.M.'s" June 1934–September 1942, March 1942 missing, £1; all in good condition.—Carpenter, Locks Farm, Washington, Sussex.

Three Hornby Special Coaches; 2,000 Cigarette Cards. Offers.—Usher, 27, Mossgiel Crescent, Dundee.

80 "Modern Worlds" and "Modern Wonders," good condition, 1d. each. Discount on large orders.—D. A. Hankin, 1, Musgrave Street, Penrith, Cumberland.

Large Collection of Meccano (fully 300 parts), comprising parts of Old and New Sets, £3/15/–.—Box No. M47.

Hornby Electric Gauge "0" Tinplate Track. S.A.E. or particulars.—43a, Embankment, Bedford.

1,800 Cigarette Cards, good condition, 650 in Albums. Send offers to—E. Jeans, Station House, Montacute, Somerset.

Lucas Bicycle Dynamo, 15/–; stamp for reply.—Evans, 4, Bryn Terrace, Ynysforgan, Morriston, Swansea.

Meccano Set No. 3; used four times; offers?—62, Winchcomb Street, Cheltenham, Glos. (See next column).

"Meccano Magazines," Bound copies for 1925 and 1926, Unbound copies for 1927 and 1928; "Hobbies Annual" 1927; "Wonder Book of Railways" 1925; "Wonder Book of Aircraft" 1931; condition as new. Offers to—Ley 14, Gaunt Street Lincoln.

WANTS

Air Stories (pre-war editions); any condition as long as complete stories are within; also Skybird Soldiers or Airmen; Dinky Toys Tanks and Personnel, Lorries, Guns, etc.; "Trems" Ship models of Italian and German Warships; also "Britain's" Model Barrage Balloons. High prices given. Particulars to—T. Rose, "Deerholme," Over Almondsbury, Nr. Bristol., Glos.

In good condition, Bassett-Lowke Steam Engine in gauge "0"; "Super Enterprise" preferred; condition and price to—Howse, 1, Hampden Villas, Wycombe Road, Princes Risborough, Bucks.

World-wide Photographs (including cuttings) of Electrical Transmission Lines, Pylons and Switching Stations.—79, West Bromwich Road, Walsall, Staffs.

No. 1A or No. 2 Meccano Clockwork Motor; state price.—Birch, 14, Ashbourne Avenue, Golders Green, N.W.11.

Hornby L.M.S. Standard Compound No. 1185 Locomotive and Tender.—Fernbank, Bank End, Furness Vale, Nr. Stockport.

Large Layout or Single Items of Twin-Trix or Hornby-Dublo wanted to form model railway.—F. Smith, 17, Wyld Way, Wembley, Middlesex.

Dinky Toys Mechanical Horse and Trailers: Flat Truck, Open Wagon and Box Van.—Price, "Elstan," Church Lane, Peppard, Oxon.

Hornby No. 1 Special Engine and/or Goods Rolling Stock.—Usher, 27, Mossgiel Crescent, Dundee.

E420 20-volt Electric S.R. "Eton" Locomotive and Tender; E220 Special 20-volt Electric L.N.E.R. "Bramham Moor" Locomotive and Tender. Good working order and good condition. Price to—14, Newtown, Gresford, Nr. Wrexham.

No. 2 Clockwork Motor; must be in good condition. State price to—N. Peach, Hill Crest, Oakerside, Nr. Matlock, Derbys.

Urgently. "M.M." for March 1942, in good condition.—Prosser-French, Dry Hill, Park Road, Tonbridge.

Gauge "0" or "00" Electric Railway wanted. Up to £25 offered. Separate Accessories also required. Details and price to—2, Rectory Close, Newbury.

Geared Roller Bearing, Part No. 167, complete; Helical Gears, Part Nos. 211a and 211b. Also Super Model Leaflets Nos. 1, 16, 18, 20, 37.—Trevor, 2 Oakfield Terrace, Cuckoo Lane, Gateacre, Liverpool.

Books such as "Hotspurs," "Champions," "Magnets," "Wizards," "Radio Funs," "Dandys," and many others prior to 1941; any number over five; all offers, if prices reasonable, accepted.—62, Winchcomb Street, Cheltenham Glos.

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